U.S. ARMY GARRISON,
FORT JACKSON, SOUTH CAROLINA

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

2017–2021

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN
Fort Jackson, South Carolina

ENDORSEMENT

This Integrated Natural Resources Management Plan (INRMP) meets the requirements of the Sikes Act (16 USC 670a et seq.) as amended.

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EXECUTIVE SUMMARY

ES.1 Type of Document

This is an Integrated Natural Resources Management Plan.

ES.2 Purpose of Document

The purpose of this document is to meet statutory requirements under the Sikes Act Improvement Amendment, Public Law 105-85, Div. B. Title XXIX, Nov. 18, 1997, 111 Stat 2017-2019, 2020-2022, and to ensure that natural resource conservation measures and military activities on mission lands are integrated and are consistent with federal stewardship requirements. The U.S. Army Garrison, Fort Jackson (Fort Jackson) has prepared this Integrated Natural Resources Management Plan (INRMP) for all lands controlled by Fort Jackson.

ES.3 Goals and Objectives of the INRMP

The goal of the INRMP is to guide the implementation of an ecosystem-based conservation program that provides for conservation of natural resources in a manner consistent with the military mission; integrates and coordinates all natural resources management actions with military mission activities in order to maintain high-quality lands for military training; provides for sustainable multipurpose uses of natural resources; and provides access for use of natural resources subject to safety and military security considerations. Fort Jackson has identified four broad goals with multiple objectives. These are:

1. Mission Sustainability

    a. Ensure no net loss in the capability of installation lands to support existing and projected military training and operations on Fort Jackson.

    b. Maintain quality training lands through management, monitoring, and rehabilitation.

    c. Manage for biodiversity to help ensure lands are maintained to facilitate greater flexibility in land use for military training requirements.

2. Stewardship

    a. Use ecosystem-based management philosophies to protect, conserve, and enhance native fauna and flora with an emphasis on biodiversity enhancement.

    b. Ensure biologically significant or sensitive natural resources are monitored and managed for long-term sustainability.

c. Monitor and manage soils, water, vegetation, and wildlife on Fort Jackson with a consideration for all biological communities and human values.

d. Provide economic and other human-valued products of renewable natural resources when such products can be produced in a sustainable fashion without significant negative impacts on the military training mission or other natural resources.

e. Ensure the natural resources conservation program is coordinated with other agencies and conservation organizations with similar interests.

f. Utilize an adaptive management approach to natural resources management that will result in modifications to plans and practices should monitoring indicate that progress is not being made as planned, or when new scientific information is discovered.

3. Compliance

a. Manage natural resources within the spirit and letter of environmental laws, particularly the Sikes Act upon which this Integrated Natural Resources Management Plan (INRMP) is predicated.

b. Protect, restore, and manage sensitive species, species listed under the Endangered Species Act, and wetlands.

c. Use procedures within the National Environmental Policy Act (NEPA) to make informed decisions that include natural resources considerations and mitigation.

d. Ensure Fort Jackson's natural resources program is consistent with the protection of cultural and historic resources.

e. Implement this INRMP within the framework of Army policies and regulations.

4. Integration

a. Ensure the integration of, and consistency among, various activities, organizations and agencies identified within this INRMP.

b. Integrate all land management activities to ensure compatibility of military training and natural resources management.

c. Coordinate implementation of natural resources management with the overall Fort Jackson environmental program.

d. Provide command elements with information needed to make decisions which include natural resources related values.

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1.0 OVERVIEW

1.1 PURPOSE

The purpose of this plan is to integrate natural resources management actions at Fort Jackson with other land uses or affecting activities, which assures good stewardship of Department of Defense (DoD) lands and complies with applicable Federal laws and regulations while supporting the sustainment of the lands needed for the military's missions. The plan is designed to provide necessary guidance for the orderly, economical maintenance of the lands and natural resources contained within Fort Jackson. The plan provides documentation for enhancing and restoring ecosystem integrity and biodiversity, as well as the utilization of water resources, forest, fish and wildlife resources, while supporting multiple-use of installation lands.

This update of the Fort Jackson integrated Natural Resources Management Plan (INRMP) has been prepared in accordance with the Department of the Army's INRMP template (14 August 2006).

1.2 SCOPE

The scope of the INRMP includes all lands controlled by Fort Jackson (Figure 1). Fort Jackson is operated under the jurisdiction of the U.S. Army Installation Management Command (IMCOM). The U.S. Army Training and Doctrine Command (TRADOC) is the senior tenant and mission commander at the installation. The plan also has a dual purpose of complying with various natural resources related laws while supporting the military mission's on Fort Jackson.

1.3 GOALS AND OBJECTIVES

Fort Jackson's identification and prioritization of current and future projects are guided by a number of interrelated items including a vision statement, a mission statement, issues, goals, objectives, and desired future ecosystem processes.
Fort Jackson's approach to natural resources management is captured in the installation's vision of the relationship between its military mission and the natural resources upon which that mission depends. The installation also has developed a natural resources management mission statement that provides an overarching premise for how Fort Jackson will manage its lands.

1.3.1 Fort Jackson Natural Resources Management Vision Statement

Support the Soldier and Fort Jackson's military mission while promoting the ecological integrity of the Fort Jackson landscape.

1.3.2 Fort Jackson Natural Resources Management Mission Statement

Through a collaborative effort between military personnel and natural resources professionals, Fort Jackson will promote the long-term ecological sustainability of its lands for military training and multiple-use opportunities. Fort Jackson will apply sound land management practices and adaptive management strategies that conserve ecological integrity through the restoration, maintenance, and

conservation of natural biotic communities. This management approach will encompass stakeholder interests, regulatory requirements, and fiscal constraints.

1.3.3 Goals and Objectives

The management goals define the broad, overall natural resources management direction for Fort Jackson. In the context of this plan, goals are defined as the general target or end result desired to be achieved through integrated resource management. Objectives are defined as more specific targets of which attainment will contribute to the accomplishment of management goals. Goals and objectives will be adjusted over time using an adaptive management approach and as Fort Jackson's military mission and ecological conditions change. Fort Jackson has identified four broad goals with multiple objectives within each of the program element action plans. The following are the goals of Fort Jackson's ecosystem-based management approach.

1. Mission Sustainability

    a. Ensure no net loss in the capability of installation lands to support existing and projected military training and operations on Fort Jackson.

    b. Maintain quality training lands through management, monitoring, and rehabilitation.

    c. Manage for biodiversity to ensure lands are maintained to facilitate greater flexibility in land use for military operations.

2. Stewardship

    a. Use ecosystem management philosophies to protect, conserve, and enhance native fauna and flora with an emphasis on biodiversity enhancement.

    b. Identify and maintain or restore native ecosystem types (i.e., longleaf pine) across their range of variation within Fort Jackson.

    c. Monitor and manage soils, water, vegetation, and wildlife on Fort Jackson with a consideration for all biological communities and human values.

    d. Provide economic and other human-valued products of renewable natural resources when such products can be produced in a sustainable fashion without significant negative impacts on the military training mission or other natural resources.

    e. Ensure the Fort Jackson natural resources program is coordinated with other agencies and conservation organizations with similar interests.

    f. Utilize an adaptive management approach to modify and improve plans, goals and objectives, and actions should monitoring indicate that progress is not being made as planned.

3. Compliance

    a. Manage natural resources within the spirit and letter of environmental laws, particularly the Sikes Act upon which this INRMP is predicated.

    b. Protect, restore, and manage endangered and other sensitive species and wetlands.

    c. Use procedures within the National Environmental Policy Act (NEPA) to make informed decisions that include natural resources considerations and mitigation.

    d. Ensure Fort Jackson's natural resources program is consistent with the protection of cultural and historic resources.

    e. Implement this INRMP within the framework of Army policies and regulations.

4. Integration

    a. Ensure the integration of, and consistency among, various activities identified within this INRMP.

    b. Integrate all land management activities to ensure compatibility of critical military training and natural resources management.

    c. Provide command elements with information needed to make decisions which include natural resources related values.

1.4 RESPONSIBILITIES

1.4.1 Installation Stakeholders

The U.S. Army Garrison, Fort Jackson, is directly responsible for operations and maintenance of Fort Jackson, including the implementation and enforcement of the INRMP. This involves the cooperation of many different organizations on Fort Jackson, as well as outside agencies.

1.4.1.1 Directorate of Public Works

Much of the responsibility for implementation of the INRMP is within the Directorate of Public Works (DPW), which acts as the primary caretaker for the lands of Fort Jackson.

Environmental Division

The preparation and most of the implementation of the INRMP are the responsibilities of the Directorate of Public Works' Environmental Division's Forestry and Wildlife Branches at Fort Jackson.

Wildlife Branch. Below are responsibilities specific to the Wildlife Branch:

1. Plan and carry out fish and wildlife management tasks through biologically sound, science-based management techniques.

2. Provide expertise and support to the Garrison Commander to ensure compliance with the Endangered Species Act (ESA) of 1973, as amended, and other applicable laws.

3. Set Fort Jackson specific hunting seasons, bag limits, and other regulations governing the harvest of wildlife resources in cooperation with the South Carolina Department of Natural Resources (SCDNR).

4. Coordinate with state and Federal fish and wildlife management agencies in fulfillment of installation fish and wildlife management responsibilities.

5. Coordinate with the Conservation Law Enforcement personnel to ensure Federal, state and installation laws and regulations pertaining to fish and wildlife are enforced.

6. Develop and implement the Endangered Species Management Component (ESMC) by identifying and prioritizing habitat improvement needs; providing direction on forest and fire management activities conducted in endangered species habitat; and providing personnel and equipment resources to assist the Forestry Branch with implementation of the wildland fire management plan and other forest management actions.

Forestry Branch. Below are the responsibilities specific to the Forestry Branch:

1. Maintain an inventory of Fort Jackson's forest resources.

2. Restore and manage for longleaf pine on suitable sites.

3. Prepare and manage the sale of Fort Jackson's marketable forest resources.

4. Implement and manage a wildland fire program to reduce forest fuels and support ecosystem management.

5. Implement portions of the ESMC pertaining to forest management.

6. Implement and incorporate South Carolina's Best Management Practices (BMPs) for Forestry.

1.4.1.2 Directorate of Plans, Training, Mobilization and Security

The Directorate of Plans, Training, Mobilization and Security (DPTMS) via its Range Operations Section is a vital component in the implementation of portions of this plan. Below are responsibilities of DPTMS, relative to the implementation of the INRMP:

1. Coordinate with and inform DPW of military training requirements and objectives as they relate to the implementation of short and long-term range development and utilization plans.

2. Coordinate with DPW on upcoming military training activities that may affect natural resources.

3. Provide a daily range and training area utilization schedule to the Directorate of Family, Morale, Welfare, and Recreation for control of hunters, fishermen, and other outdoor recreational users.

4. Provide coordination and support for providing access to training lands for the conduct of natural resources management and monitoring.

5. Integrated Training Area Management (ITAM) Program implementation.

1.4.1.3 Directorate of Family, Morale, Welfare, and Recreation

The Directorate of Family, Morale, Welfare, and Recreation (DFMWR) is responsible for outdoor recreation activities and facilities on the installation, and the recreational aspects of the fish and wildlife program. Programs that particularly affect Fort Jackson natural resources include hunting and fishing, hiking, picnicking, boating, and camping. DFMWR will coordinate its natural resources related activities with the Wildlife Branch to ensure compatibility with this INRMP. Below are specific responsibilities of the DFMWR:

1. In cooperation with the Wildlife Branch, issue/sell Fort Jackson hunting and fishing permits. Monies collected from these licenses will be deposited into the Army Fish and Wildlife Conservation Fund (21X5095). DFMWR shall receive no more than 10 percent of annual permit revenues for fee collection administration.

2. Disseminate information to hunters and fishermen related to areas available for hunting and fishing each day, in coordination with DPTMS.

3. Plan and conduct group hunting and fishing activities, such as fishing tournaments.

4. Operate and maintain the Fort Jackson archery range and other recreational shooting ranges.

5. Participate in national and state-sponsored hunting and fishing events such as youth hunting days and the National Hunting and Fishing Day.

6. Assist DES Security with the public's access to the Palmetto Trail.

1.4.1.4 Directorate of Emergency Services

The Directorate of Emergency Services' Provost Marshal Office is responsible for enforcement systems and protection of natural resources and enforcement of hunting and fishing laws and regulations on Fort Jackson. They will provide resources for these purposes and cross-train Military Police and/or civilian wardens to accomplish this mission.

The Directorate of Emergency Service's Fire Prevention and Protection Division is responsible for performing wildfire suppression actions at night and on weekends and holidays. In addition, they provide wildfire suppression support to the DPW Forestry Branch when needed during normal duty hours. The DPW Forestry Branch is responsible for performing wildfire suppression during normal duty hours, Monday – Friday.

1.4.2 External Stakeholders

The U.S. Fish and Wildlife Service (USFWS) and S.C. Department of Natural Resources (SCDNR) cooperate in the development of the INRMP and will participate in the annual review. Furthermore, the USFWS and SCDNR participate in the formal 5-year review or revision of this plan.

1.5 AUTHORITY

This plan was prepared to meet statutory requirements under the Sikes Act Improvement Amendment, Public Law (PL) 105-85, Div. B. Title XXIX, Nov. 18, 1997, 111 Stat 2017-2019, 2020-2022. In November 1997, the Sikes Act, 16 U.S. Code (USC) § 670a et seq., was amended to require the Secretary of Defense to carry out a program to provide for the conservation and rehabilitation of natural resources on military installations. To facilitate such programs, the Sikes Act requires the secretary of each military department to prepare and implement an INRMP at appropriate military installations throughout the U.S. under their respective jurisdictions, unless the secretary determines the absence of significant natural resources on a particular installation makes the preparation of such a plan inappropriate. In addition, the Sikes Act requires that the INRMP is prepared in cooperation with, and reflects the mutual agreement of, the Secretary of the Interior (acting through the Director of the USFWS) and the head of each appropriate state fish and wildlife agency for the state(s) in which the military installation concerned is located.

Army Regulation (AR) 200-1 (Environmental Quality – Environmental Protection and Enhancement, dated August 2007 [AR 200-1]) is the implementing regulation that ensures the policies, procedures, and standards for the conservation, management, and restoration of natural resources on military installations are consistent with and in support of the military mission and in consonance with national policies. Additionally, the AR provides general requirements for the content of installation INRMPs, as well as, criteria for achieving integration with the installation's mission and other activities. Cooperative agreements with Federal and state fish and wildlife agencies set forth in this regulation are superseded, under the amended Sikes Act, by agency's approval of the INRMP.

1.6 STEWARDSHIP AND COMPLIANCE DISCUSSION

The responsibilities of the natural resources management program at Fort Jackson as provided by the U.S. Army can be classified as either meeting stewardship needs or compliance requirements. Stewardship projects (e.g., watchable wildlife project) are based upon the land management responsibility of the U.S. Army, and are not required to be implemented to meet regulatory needs. Compliance projects (e.g., endangered and threatened species conservation) are mandatory and are required to be implemented to meet laws and regulations that apply to the operations of Fort Jackson.

Fort Jackson considers its stewardship responsibilities during the planning and analyses of natural resources and military training actions. For example, potential erosion and mitigation measures to eliminate or reduce erosion would be considered when planning for the construction of a new range or facility. By considering its stewardship responsibilities during the planning and analysis phase, Fort Jackson would eliminate or minimize potential soil erosion and sedimentation in streams and other water bodies on the installation.

1.7 REVIEW AND REVISION PROCESS

In accordance with the Sikes Act of 1997 (16 USC. Sec. 670a et seq.), DoD (DoD Instruction 4715.03), and U.S. Army policy(AR200-1), Fort Jackson will review the INRMP annually in cooperation with the USFWS and SCDNR. The annual review of the goals and objectives and project implementation schedules will generate annual assessments of the natural resources conservation metrics. Fort Jackson will review the INRMP no less often than every 5 years for operation and effect in coordination with the USFWS and SCDNR. The INRMP will be evaluated annually in the following six performance areas:

1. INRMP Implementation;
2. Partnership/Cooperation and Effectiveness;
3. Team Adequacy;
4. INRMP Impact on the Installation Mission;
5. Status of Federally Listed Species;
6. Fish and Wildlife Management and Public Use.

Annual reviews of the Fort Jackson INRMP will include annual revisions so that the review and revision processes are integrated. IMCOM must approve each updated version of the INRMP prior to implementation.

1.8 MANAGEMENT STRATEGY

The purpose of natural resources management at Fort Jackson is to support the military mission while maintaining the integrity and biodiversity of the natural resources. Natural resources management at Fort Jackson relies on an ecosystem-based management philosophy. This strategy blends multiple-use needs and provides a consistent framework to managing military installations, while ensuring the integrity of the ecosystem. The principles, policies, and goals of this type of management system are provided below.

1.8.1 Ecosystem-Based Management Approach

Ecosystem Management and Biodiversity Conservation

It is the policy of the Army and the DoD to utilize an ecosystem management approach for land use management and planning on Army installations DoDI 4715.03 (Natural Resources Conservation Program). DoDI 4715.03 describes ecosystem-based management as, "a process that considers the environment as a complex system functioning as a whole, not a collection of parts, and recognizes that people and their social and economic needs are a part of the whole." The DoD ecosystem management goal is "to ensure that military lands support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrity. Ecosystem-based management includes a shift from single species to multiple species conservation, the formation of partnerships necessary to consider and manage ecosystems that cross boundaries, the use of best available scientific information in decision making, and the use of adaptive management techniques in natural resources management. Over the long term, the ecosystem management approach shall maintain and improve the sustainability and biological diversity of terrestrial and aquatic ecosystems, while supporting sustainable economies, human use, and the environment required for realistic military training operations."

Biodiversity refers to the variability among living organisms and the ecological complexes of which they are part. Biodiversity includes ecosystem diversity, species diversity, and genetic diversity. Ecosystem diversity refers to the variety of habitats and biotic communities. Species diversity refers to the number, types, and distribution of species within an ecosystem; and genetic diversity refers to the variation in genes that enables organisms to evolve and adapt to new conditions. Biodiversity conservation involves the maintenance or restoration of native ecosystems, maintenance or reestablishment of viable populations of all native species that occur in an installation's natural habitats, and maintenance of evolutionary and ecological processes. The DoD identifies the following five reasons for conserving biodiversity on military lands (The Keystone Center 1996):

- Sustain natural landscapes required for the training and testing that are necessary to maintain military readiness.
- Provide the greatest return on the Defense investment to preserve and protect the environment.
- Expedite the compliance process and help avoid conflicts.
- Engender public support for the military mission.
- Improve the quality of life for military personnel.

The Keystone Center report notes that the challenge is "to manage for biodiversity in a way that supports the military mission". This strategy relies on the INRMP as the primary vehicle for implementing biodiversity conservation on military installations. This strategy for conserving biodiversity includes the following principles:

- Support the military mission.
- Use joint planning between natural resource managers and military operations personnel.
- Integrate biodiversity conservation into INRMP, ITAM, and other planning protocols.

- Involve internal and external stakeholders up front.
- Emphasize the regional (ecosystem) context.
- Use adaptive management.
- Involve scientists and use the best science available.
- Concentrate on results.

Fort Jackson will use ecosystem management principles to guide its program over the next five years and beyond. This management strategy enables the installation to conduct military training while simultaneously conserving natural resources. Ultimately, the maintenance of quality training areas depends on the maintenance of natural landscapes through conservation of the installation's natural resources.

Natural Community Management

DoDI 4715.03 (Natural Resources *Conservation Program*) states that ecosystem management involves "conducting installation programs and activities in a manner that identifies, maintains, and restores the composition, structure, and function of natural communities that comprise ecosystems, to ensure their sustainability and conservation of biodiversity at landscape and other relevant ecological scales to the maximum extent that mission needs allow." Management systems that focus on natural communities are particularly efficient because they focus efforts on entire communities rather than individual species. Natural communities are valuable elements of natural diversity; and the protection, restoration, and maintenance of natural communities provides protection for the majority of species without the requirement for intensive attention to individual species (Schafale and Weakley 1990). Management at the natural community scale not only protects and maintains populations of listed species, but also promotes expansion and recovery by improving habitat conditions throughout the ecosystem.

Conserving Biodiversity on Military Lands – A Handbook for Natural Resource Managers (Leslie et al. 1996) recommends that management efforts on military installations focus on native communities and species with particular conservation importance, as determined primarily by their level of rarity and imperilment. This INRMP focuses on natural communities that comprise the imperiled longleaf pine ecosystem. The longleaf pine ecosystem supports tremendous biodiversity and a multitude of species identified as rare at the state and federal levels. Longleaf pine savannas support some of the greatest species richness in temperate North America (up to 52 species of plants in a single square meter), and contain more rare species than any other community type in the state (Schafale and Weakley 1990). The level of imperilment is high, with longleaf pine forests and savannas being listed as one of the 21 most endangered ecosystems in the United States (Leslie et al. 1996).

1.8.2 Ecosystem Management Goals

Fort Jackson has established four broad management goals discussed in detail in Section 1.3.3 of this document. Additional goals related to an ecosystem approach of management include:

1. Identify and maintain or restore native ecosystem components (eg. Longleaf Pine) across their range of variation within Fort Jackson.

2. Manage natural resources to maintain or restore essential ecological processes integral to species interactions and ecosystem resiliency.

3. Manage large areas over sufficiently long time periods to allow biological evolution and changing system dynamics.

4. Represent, maintain, or reestablish viable populations and genetic diversity of target species, especially rare or endemic species.

5. Monitor target species, communities and conduct research to guide management and identify progress toward goals as part of the adaptive management process.

1.9 OTHER PLAN INTEGRATION

The INRMP is integrated with other Fort Jackson plans to include the; Integrated Pest Management Plan, Integrated Wildland Fire Management Plan, Installation Master Plan, Range Complex Master Plan, Integrated Training Area Management Work Plan.

2.0 CURRENT CONDITIONS AND USE

2.1 INSTALLATION INFORMATION

2.1.1 General Description

Fort Jackson, which spans more than 52,000 acres is located in central South Carolina in Richland County and is adjacent to and part of the city of Columbia, the capital of South Carolina (Figure 1).

The installation is approximately five miles east of the Columbia business district. Columbia is the largest city in the state with a population of more than 129,000 according to the 2010 U.S. census, followed by Charleston and North Charleston in size.

2.1.2 Regional Land Uses

2.1.2.1 Richland County

Most of the following information in this section was taken from the 2009 Richland County Comprehensive Plan, dated December 15, 2009 and approved by the Richland County Council.

Fort Jackson is located entirely in Richland County, South Carolina. The county covers 771.74 square miles: 756.54 land and 15.21 water. Approximately 24.3% is located in the flood plain. There are three categories used to identify current land use in the county: urban, suburban, and rural.

Currently, most of Richland County is classified as rural, with each planning area containing some rural character. The entire North Central is currently designated as rural. Suburban land uses are

prevalent throughout the Beltway and extend well into the North East and North West. Currently, the only urban land uses are located in the Beltway. Note Fort Jackson is located east of the Beltway in the South East planning area (Figure 2).

Richland County is divided into five planning areas: North West, North Central, North East, Beltway, and South East. The Beltway contains over half of all institutional land uses in the County (56.9%), and the largest percentages of residential (28%), commercial (65%), government (67.8%), industrial (56.8%), and vacant land (37.2%). Over half of the County's agricultural land is located in the South East (54.5%), and the North East contains the highest percentage of recreational uses (58.1%). Please note these percentages include both unincorporated and incorporated areas.

The South East covers approximately 416.6 square miles, containing portions of Columbia, Cayce, and Eastover, bordering Sumter, Calhoun, and Lexington Counties, and including Fort Jackson, McEntire Joint National Guard Base, and the Congaree National Park. The majority is designated as rural (approximately 95%), with the remainder designated as suburban. The largest percentage of land in the South East is comprised of agricultural uses (37.3%).

2.1.2.2 Fort Jackson/McEntire Joint Land Use Study (JLUS)

The Joint Land Use Study (JLUS) is an ongoing effort between the US Department of Defense (DoD), U.S. Air Force, U.S. Army, South Carolina National Guard, South Carolina Air National Guard, Central Midlands Council of Governments, Richland County, the City of Columbia, Kershaw County, Fort Jackson, McCrady Training Center, and McEntire Joint National Guard Base to identify solutions to suburban encroachment around the County's military installations. The 2009 Richland County Comprehensive Plan references the JLUS, and in concurrence with the City of Columbia, and recommendations from the DoD, has placed a buffer on the Future Land Use Map around Fort Jackson, McCrady Training Center, and McEntire Joint National Guard Base. The buffer is there to help identify areas around the base that could be affected by noise, smoke, or other issues associated with military training and the mission of the installations. It is not the intent of the JLUS to discourage growth and development but rather to create a balance between the needs of the military and the needs of the surrounding communities.

2.1.3 Abbreviated History and Pre-Military Land Use

2.1.3.1 Pre-Army History of the Fort Jackson Area

The land that became Fort Jackson was originally home for pre-contact Native Americans who came and went as the seasons changed. Beginning in the eighteenth century, EuroAmericans began settling in the region, most being white yeoman farmers whose small farms were scattered among modest plantations whose owners hoped for large profits from cash crops. Although the soils were characteristically excessively well drained and nutrient poor across the Sandhills, there were fertile spots where corn and cotton thrived. In those locations, a few antebellum planters were able to successfully compete against the lower Richland county planters whose rich lands were linked to the Congaree River. After the Civil War, the plantation system was disrupted and a dispersed mostly poor white and black farm population attempted to subsist on the land. But still

scattered among them were yeoman farmers with sizable tracts and comfortable if not thriving farms. During the summer, wealthy Columbia residents would temporarily increase the population as they moved into the Sandhills to escape the city heat. There was also some light industry in the area, mostly saw and grist mills. Like the rest of the South, the Sandhills suffered the fortunes of a reliance on cotton. To ease the economic downturns, Sandhill farmers turned to their timber resources, which they could sell to Columbia residents. Then just prior to World War I, the City of Columbia Chamber of Commerce saw the land's potential for a military installation. In 1917 the Army came to the Sandhills. Overall, these Sandhills had not been the most desirable lands for a nineteenth and twentieth century agricultural nation. Still, it was home to some tenacious planters, yeoman farmers and tenants. [From "As Other People Now": A Settlement History of the Fort Jackson, South Carolina Region (Plaag and Smith, 2009)].

2.1.3.2 History of the Army at Fort Jackson

The installation originally opened with Congressional approval of the 6th National Army Cantonment on 17 June 1917 on a 1,156-acre tract of land donated by the citizens of Columbia. This property was part of the Lordly estate, comprising about 20,000 acres originally owned by General Wade Hampton. The federal government later acquired an additional 19,742 acres and leased thousands of acres more. Camp Jackson was established on 18 July 1917 as a World War I training camp. It was named for Andrew Jackson, seventh President of the United States, who was born in New Lancaster, South Carolina. One year after its establishment, 45,000 officers and enlisted men were training as the 30th and 61st divisions at Camp Jackson. With the Armistice in 1918, Camp Jackson was demobilized as a full time training site. However, from 1925 to 1940, it was state-controlled and used as an encampment and training area for troops of the South Carolina National Guard.

During World War II, Fort Jackson became a permanent military installation, used primarily for infantry training. Additional property was acquired on the eastern and northern sides of the installation until the acreage included 52,562 acres. The famed 8th Infantry Division was activated here on 1 July 1940, and later the same year the 30th "Old Hickory" Division, also named in honor of Andrew Jackson, moved to Fort Jackson. A program to erect mobilization type buildings began, and a $500,000 small arms range, with 400 targets, was placed in operation. More than 100 miles of hard surfaced roads were constructed. These roads were named for Revolutionary War and Civil War heroes from South Carolina. General construction on the installation continued until May 1943, with a total expenditure of $29,445,281 for all facilities.

Several Army divisions, destined to become famous during action in World War II, trained at Fort Jackson. Included in this "saga" of Fort Jackson divisions were the 4th, 6th, 8th, 26th, 30th, 77th, 87th, 100th, and 106th. In addition, troops of the I and XIX Corps trained here. An estimated 500,000 American fighting men received some part of their World War II training at Fort Jackson. The Army Services Personnel Replacement Depot was located here in May 1945, and Fort Jackson became a replacement training center in November 1946. In June 1947, Fort Jackson was designated as one of the four permanent replacement training centers in the United States. The famous 5th Infantry Division was subsequently reactivated on the post as a training organization. The 5th Division was then moved to Indiantown Gap Military Reservation, Pennsylvania in April 1950 and Fort Jackson was prepared for a "standby" status.

In January 1951 the 31st Infantry Division, the "Dixie Division", made up of National Guard units from Alabama and Mississippi, was ordered to active duty at Fort Jackson. The 31st was transferred to Camp Atterbury, Indiana, in April 1952 after participating in "Exercise Longhorn" in Texas.

On May 15, 1954 the 8th Infantry Division was transferred to Camp Carson, Colorado and replaced by the famous 101st Airborne, "Screaming Eagle" Division. That Division was moved to Fort Campbell, Kentucky in March 1956, and Fort Jackson was designated as the United States Army Training Center, Infantry.

Fort Jackson grew over the years, but most of the buildings were temporary. Finally, in 1964 construction began on permanent steel and concrete buildings to replace wooden barracks that had housed the Fort's troops since the early 1940s.

With the establishment of the modern volunteer Army in 1970 and the need to promote the attractiveness of service life, construction peaked in an effort to modernize facilities and improve services. In June 1973 Fort Jackson was designated as a U.S. Army Training Center. Changes to enhance training have occurred over the years. Victory Tower, an apparatus designed to complement Basic Combat Training, was constructed to reinforce the skills and confidence of the individual soldier. Field training exercises (FTX) were incorporated into Advanced Individual Training so soldiers would have an opportunity to practice a military occupational specialty and common skills in a field environment. By 1988, Initial Entry Training strategy was implemented. Training focused on hands-on skill development. As a result of Base Realignment and Closure actions during the early 1990s, Fort Jackson received additional missions and personnel, including the Soldier Support Institute (consisting of the Adjutant General School, Finance School, and Recruiting and Retention School), Armed Forces Chaplaincy Center, and the National Center for Credibility Assessment.

2.1.3.3 History of Natural Resources Management at Fort Jackson

Fort Jackson expanded in 1939 from the 1,200-acre Camp Jackson of World War I to approximately 52,000 acres. Most of the acreage was acquired from private landowners who utilized the land for agricultural and silvicultural purposes. The landscape consisted of terraced pastures, farmlands, and timberlands not intensively managed that relied primarily on natural regeneration of Longleaf and Loblolly pine.

Training during World War II through the Vietnam War brought large scale range construction that required clearing of thousands of acres of land. The focus during this period was wildfire suppression with little silvicultural or wildlife management activities.

Forest Management

An emphasis on forest management began with the establishment of a Forestry Section in 1952. Prior to 1952, Fort Jackson had not been properly managed or protected from fire. Much of Fort Jackson was dominated by scrub oak and less than half of the property was satisfactorily stocked with pine. Between 1953 and 1969, more than 5,300,000 pine trees were planted or direct seeded

as part of a reforestation program (Natural Resources Program 1969). During the 1950s and 1960s, forest management priorities included reforestation resulting in approximately 8,623 acres of Slash pine planted in plantations. Wildfire suppression continued, and initial prescribed burning activities began. In addition, 326 miles of firebreaks were constructed along with 375 miles of secondary dirt roads to aid in wildfire prevention and suppression.

The 1990s through the 2000s brought intensive silvicultural and wildlife management practices. This included conversion of most of the offsite Slash pine to Longleaf pine, planting of 6,651 acres of Longleaf pine plantations, prescribed burning in both dormant and growing seasons, and control of undesirable vegetation with chemical and mechanical treatments. These efforts, driven by the need to enhance the endangered red-cockaded woodpecker habitat, continue today.

Fish and Wildlife Management

Prior to 1957, a rod and gun club was in existence which accomplished only minor natural resources management actions. Most actions were directed toward fish and game management.

During 1957, Fort Jackson's Provost Marshal was assigned the responsibility for game management, fish pond improvement and conservation law enforcement. In addition, the Fish and Wildlife Conservation Committee was formed. This committee received technical guidance from the U.S. Fish and Wildlife Service (USFWS) and the S.C. Wildlife Resources Department. Management emphasis was related to stocking fish ponds and planting food plots for game species (Natural Resources Program 1969).

Between 1957 and 1964, the USFWS provided 250,000 bass, bream and catfish for pond stocking. During this period, the S.C. Wildlife Resources Department furnished 60,000 fish for stocking, 20,000 bicolor lespedeza plants, 20 pounds of bicolor seed and 28 pen-reared turkeys for release (Natural Resources Program 1969).

In 1965, a Wildlife Unit was established under the Post Engineer, and a professional forester with a degree in fish and wildlife management was hired in 1966. The primary responsibilities of this unit were to improve recreational fishing and habitat for deer, quail, and other game species (Natural Resources Program 1969). From 1966 to the mid-1980s the bulk of wildlife management activities were directed at game management. Prior to 1986, the only records of non-game and endangered species management actions include records of surveys for the red-cockaded woodpecker, and the subsequent inventories and protection of individual colony sites.

During the late 1980s, a professional wildlife biologist and wildlife technician were hired. Beginning in 1989, management emphasis was shifted from game management to endangered species management. A red-cockaded woodpecker conservation plan was prepared, and planning level surveys for rare and endangered species were initiated. Support and guidance from the USFWS and South Carolina Department of Natural Resources (SCDNR) was obtained and a new era of natural resources conservation began on Fort Jackson. Cooperative support from the USFWS and SCDNR continue today.

2.1.4 Military Mission

Fort Jackson's primary mission is Army Basic Combat Training (BCT). The installation is one of 5 BCT installations in the nation. After Soldiers complete BCT they progress to Advanced Individual Training (AIT) at Fort Jackson and many other installations across the United States. There is limited AIT training offered at Fort Jackson.

Fort Jackson provides for the training of 54% of all Soldiers and 60% of the women entering the Army each year. Fort Jackson trains approximately 50,000 BCT and AIT Soldiers every year. On the 51,316 acres, there are more than 35 ranges and 141 field training areas and 1,100 buildings. More than 3,500 active duty Soldiers and their 14,000 family members are assigned to the installation at any one time and make this area their home. Fort Jackson employs approximately 3,500 civilians and provides services for more than 46,000 retirees and their family members and Jackson contributes $2.2 billion to the local economy. In addition, more than 200,000 family members visit Fort Jackson each year to attend basic training graduation activities.

The mission statement of Fort Jackson is:

"The United States Army Training Center and Fort Jackson (USATC&FJ) trains Soldiers and other personnel in support of full spectrum operations; receives and transforms volunteers into Soldiers who are able to function effectively in their first unit of assignment; trains and educates our military and civilian leaders; and provides the highest possible quality of life for our Soldiers and their Families."

The installation vision is as follows:

"Team Jackson, a proud legacy of training and inspiring American Soldiers for over 90 years, committed to transforming individuals and institutions, while at the same time providing the highest quality of life and care for our Soldiers, Families, and Civilians. Fort Jackson: Tradition, Training, Transformation."

The Army Training Center and Fort Jackson executes BCT and AIT; enhances Drill Sergeant and Cadre Leader Training; and synchronizes Service Support Operating Systems in order to effectively transform civilians, train Soldiers, and develop leaders who live the Warrior Ethos. Soldiers are trained to be physically tough, mentally adaptive, and able to contribute to the success of their first unit of assignment.

Fort Jackson is the BCT Center of Excellence and also home to the U.S. Army 81st Regional Support Command, U.S. Army Recruiting Battalion (Columbia), Armed Forces Chaplaincy Center, U.S. Army Soldier Support Institute, Army Drill Sergeant School, National Center for Credibility Assessment, the S.C. Army National Guard's McCrady Training Center, The U.S. Army Reserve Readiness Command, Navy Reserve Center, and Marine Corps Detachment.

Military training organizations on the installation support the Training and Doctrine Command (TRADOC) mission to conduct initial entry training for BCT/AIT Soldiers, noncommissioned

officer academy (NCOA) Soldiers, chaplains, and support basic and advanced officer training courses at Finance and AG schools. Fort Jackson is also the home station for a myriad of active, reserve, and National Guard units like the 157th Brigade Headquarters Infantry Brigade, 108th Training Command (IET), 17th Military Police detachment and the 80th Training Command (TASS).

Fort Jackson provides ranges and maneuver training areas principally designed to support the institutional training organizations and units garrisoned on the installation. Fort Jackson is also tasked with supporting reserve component unit training and, the mobilization and demobilization of Army reserve/Navy component units and personnel. Installation mobilization requirements consist of in-processing and trans-shipment of all personnel processed for assignment and released from duty.

Coalition training is supported upon mission assignment and IAW approved Program of Instruction requirements. Currently, the ranger unit from Fort Stewart schedules training requirements at McEntire International Air Field, annually. Fort Jackson allows use of its Restricted Airspace R6001, ranges, and training land in support of these training units.

The South Carolina Army National Guard (SCARNG) is licensed to use approximately 15,000 acres in the eastern area of Fort Jackson. This area is known as the McCrady Training Center (Figure 3).

2.1.5 Operations and Activities

The military mission and management of natural resources in support of the military mission have the potential to affect the natural environment on Fort Jackson. Military training has the potential to disturb the soil surface thus resulting in increased soil erosion and sedimentation of surface waters on the installation. Timber harvesting practices associated with forest and wildlife conservation actions have the potential to disturb soils and increase soil erosion and sedimentation. In addition, roads and firebreaks are a major source of erosion, especially in training areas. Further, the construction of infrastructure to support the military mission can result in the permanent loss of natural habitats.

2.1.6 Military Training Constraints and Opportunities

Coordination between the environmental staff and range planners, and proper management of resources can prevent constraints to training. There are minor constraints to military training activities in certain training areas (Figure 4). For example, red-cockaded woodpecker (RCW) clusters and wetlands can limit training activities in some training areas. Current maps and descriptions of constraints to training are available from the DPW's Wildlife Branch and from the DPTMS's Range Operations and ITAM Office. Utilization of the most current constraints maps and information will facilitate the identification of areas for training opportunities (Figure 4).

2.2 GENERAL PHYSICAL ENVIRONMENT AND ECOSYSTEMS

2.2.1 Climate

Fort Jackson is in a humid continental area. Predominant climatic factors are the installation's location in the lower latitudes and its proximity to the Appalachian Mountains to the west, which block the approach of unseasonable cold weather in winter. This southern temperate region can experience temperatures ranging from below freezing to greater than 100 degrees Fahrenheit (ºF), however, there is a relatively narrow annual temperature range, from a mean daily temperature of 81ºF in July to 44ºF in January.

The Bermuda high, a semi-permanent high pressure cell centered in the Atlantic Ocean, dominates summer weather. The influx of warm moist air from the south causes days to be hot and humid. The average high temperature in July, the hottest month of the year, is 91ºF. Temperatures greater than 90ºF are experienced an average of 66 days per year. Winters are generally mild, and January, the coldest month, has an average daily minimum temperature of about 32ºF. Temperatures below freezing are experienced an average of 61 days a year. The frost-free growing season is about 190 days, with the first frost occurring in late October and the last frost usually occurring in mid-April.

The average annual precipitation is 46 inches, with summer constituting 39% of annual rainfall. Average monthly rainfall for July and August is 5-6 inches. Minimum amounts of rainfall occur during October and November when monthly averages are about three inches. About every five years an ice storm occurs, severe enough to cause some timber damage. Every few years a tropical storm will cause heavy rains for 2-3 days. In extremely rare instances, tropical storm winds will come inland far enough to cause damage, such as occurred during Hurricane Hugo in 1989.

2.2.2 Topography

Gently to moderately rolling, moderately dissected high plains occupy most of Fort Jackson. These high plains are interrupted by the nearly flat alluvial plains of Gills, Cedar, and Colonels creeks and their tributaries and an irregularly distributed, gently sloping, low relief area in the central portion of the installation near the headwaters of Cedar Creek. Local relief in the high plains is largely 165-250 feet. Slopes are predominately 3-8%; however, along narrow stream valleys, slopes commonly exceed 15%.

Elevations in the high plains are mostly 295-459 feet above sea level. The lowest elevation in the high plains is about 200 feet, adjacent to the alluvial plain of Colonels Creek in the eastern portion of the installation. The highest elevation, 540 feet, is at Weir Tower in the west-central portion of the installation.

Flat to gently rolling low plains characterize the extreme western portion of the installation, including a major portion of the cantonment area and the alluvial plains occupied by southwesterly flowing Gills and Mill creeks. Local relief around the valley of Gills Creek and its tributaries is generally less than 60 feet. Slopes are predominately between 0-3% on the alluvial plains, and slopes in the cantonment area are predominately between 3-8%.

Upper valleys of Mill and Cedar Creeks occupy low plains along the southern boundary of Fort Jackson. Local relief is generally less than 40 feet, and slopes are usually less than 3%.

In the eastern portion of Fort Jackson, flat to gently sloping, alluvial plains are occupied by Colonels Creek and its tributaries. Local relief is less than 20 feet, and slopes are generally less than 3%. Local relief of 100 feet and 3-8% slopes characterize a gently rolling upland area in the extreme southeastern corner of the installation, adjacent to Colonels Creek. Elevations in the low plains are generally 180-280 feet above sea level. The lowest elevation in the low plains is less than 160 feet, occurring in the flood plain of Colonels Creek in the extreme southeastern portion of Fort Jackson. The highest elevation in the low plains is about 340 feet at the head of Gills Creek.

2.2.3 Geology

Fort Jackson is on the northwestern edge of the Atlantic Coastal Plain Province, a region of low to moderate relief and gently rolling plains, known as the Sandhills. The Fall Line, a zone that marks the boundary between younger softer sediments of the province and ancient crystalline rocks of the Piedmont Plateau Province, is about 4 miles west of the cantonment area (Gene Stout and Associates 2004).

The principal geologic formation in the Sandhills is the Tuscaloosa, which consists of marine deposits of light-colored sands and kaolin clays. Most soils at Fort Jackson are formed from Tuscaloosa sediment. A Quaternary sand terrace layer overlies the Tuscaloosa formation, which lies on a complex of old metamorphic and igneous rock. The Tuscaloosa complex generally consists of clay strata overlying unconsolidated sands. The Upper Cretaceous-age Tuscaloosa formation outcrops over most of Fort Jackson and consists of unconsolidated, crossbedded, kaolinitic, and arkosic sands. It lies uncomformably on the peneplained surface of crystalline rocks. Near the northern boundary of the installation, older crystalline rocks of the Carolina Slate Group outcrop at the surface. In the northwest portions of Fort Jackson, Pleistocene sands and gravel are at the ground surface (Gene Stout and Associates 2004).

2.3 GENERAL BIOTIC ENVIRONMENT

2.3.1 Threatened and Endangered Species

Endangered species management receives priority over all other forms of natural resources management.

The USFWS maintains the list of species that are protected by the Endangered Species Act (ESA) of 1973. The current List of At-Risk, Candidate, Endangered, and Threatened Species for Richland County, South Carolina can be found at:

www.fws.gov/charleston/EndangeredSpecies_County.html.

2.3.1.1 Animals

Of the species currently federally-listed for Richland County (October 2015), the red-cockaded woodpecker (Picoides borealis) (RCW) is the only listed animal species known to occur on Fort Jackson.

Fort Jackson's historic RCW population declined to a low of 10 active clusters in 1995. Since that time, RCW management practices and habitat improvements have increased the population. Currently, there are 37 active RCW clusters known at Fort Jackson. The conservation of this species is described in the Endangered Species Management Component (ESMC) for the Red-cockaded Woodpecker on Fort Jackson (Appendix 2). The ESMC also provides for the management of other plant and animal species on Fort Jackson associated with the longleaf pine ecosystem.

2.3.1.2 Plants

Two federally-listed endangered plant species, Rough-leaved loosestrife (Lysimachia asperulaefolia) and Smooth coneflower (Echinacea laevigata) occur on Fort Jackson. These two species were identified during the 1992 rare and endangered plant survey (Nelson 1992).

The management and monitoring of the Rough-leaved loosestrife population is implemented in accordance with the Endangered Species Management Component for Smooth Coneflower (Echinacea laevigata) and Rough-leaved Loosestrife (Lysimachia asperulaefolia), Fort Jackson, South Carolina (Appendix 3).

2.3.2 Wetlands and Deep Water Habitats

2.3.2.1 Wetlands

The Sandhills region is characterized by well-drained, sandy hills that are dissected by a dendritic system of wetlands and small streams. Typical jurisdictional waters and wetlands on Fort Jackson include sandhill seeps, streamhead pocosins, small stream swamps, vernal pools, and open water habitats consisting of streams, and impoundments.

The USFWS wetland classification program has developed a national Wetlands Geodatabase. This database provides spatial data in the form of National Wetland Inventory (NWI) Maps. Table 2.1 lists the NWI acreages of wetlands on Fort Jackson. Wetlands, as depicted on NWI maps, are shown on Figure 5. NWI maps often underestimate or overestimate wetland acreage due to coarse scale interpretation. Small scale wetlands (e.g., sandhill seeps, small depression ponds, and vernal pools) are found on Fort Jackson; and therefore, the actual acreage and distribution of wetlands on the installation is likely greater than estimates based on NWI maps.

Table 2.1. NWI wetland estimates for Fort Jackson

NWI Wetland	Acres
Palustrine	3,795
Lacustrine	262
Total	4,057

Fort Jackson's four major drainage systems and their associated tributaries drain into watersheds of the Wateree and Congaree Rivers. Hydrologic conditions within these systems have created a variety of aquatic and wetland biotic communities.

Aquatic and wetland vegetative communities occurring on Fort Jackson include, but may not be limited to; Open Water (Ponds, Lakes, and streams), Wetland Mixed Hardwoods, Wetland Mixed Hardwoods-Pine, Wetland Mixed Hardwoods-Shrub, Pine-Shrub, Pine-Wetland, Mixed Hardwoods, Marsh, and Floating Aquatic.

2.3.2.2 Lakes and Ponds

A total of 29 impoundments are located on Fort Jackson, which comprises the deep water habitats on the installation (Figure 5).

2.3.3 Fauna

The fauna found on Fort Jackson is typical of the sandhills region of South Carolina's Upper Coastal Plain physiographic province. Over the years, baseline and Planning Level Surveys have been performed for various classifications of fauna. These include herpetological surveys, butterfly survey, fish population surveys, raptor survey, migratory bird surveys, benthic macroinvertebrate survey, and installation-wide surveys for threatened and endangered fauna. Incidental observations by natural resources personnel contribute to the inventory of fauna and herpetofauna on Fort Jackson. In addition, surveys and monitoring efforts are performed for white-tailed deer, furbearer species, game birds, and invasive and nuisance species such as feral pigs and beavers. Detailed reports and species lists are available at the Fort Jackson Directorate of Public Works' Environmental Division.

2.3.4 Flora

The flora found on Fort Jackson is typical of the sandhills region of South Carolina's Upper Coastal Plain physiographic province. Twelve vegetation cover types have been recognized for the purpose of cover type mapping, with at least 30 plant community types and 11 subtypes (Gaddy 2003).

The high diversity of plant communities includes the presence of some rare (G1 and G2) plant communities. These include the Sandstone Gravel Longleaf Pine Woodland and the South Carolina Central Longleaf Pine Woodland.

Detailed reports and species lists are available at the Fort Jackson Directorate of Public Works' Environmental Division.

3.0 ENVIRONMENTAL MANAGEMENT STRATEGY AND MISSION SUSTAINABILITY

3.1 SUPPORTING SUSTAINABILITY OF THE MILITARY MISSION AND THE NATURAL ENVIRONMENT

Sustainability is defined as the ability to provide for the needs of the current mission without damaging the ability of future missions to maintain their needs. When a process is sustainable, it can be carried out over and over without any negative environmental impacts or impossible high costs to anyone involved.

Monitoring and measurement is fundamental to adaptive management and mission sustainability. It ensures the effectiveness of the management, plans, controls, and training. Furthermore, it enables Fort Jackson to identify its progress toward achieving objectives and targets, and the reasons for the installation's level of achievement. Without effective monitoring and measurement it would be impossible for Fort Jackson to continually improve, which is the basis of sustainability.

3.1.1 Integration of the Military Mission and Sustainable Land Use

The U.S. Army's Integrated Training Area Management (ITAM) program is an integral part of the implementation of an INRMP on an installation. ITAM is a comprehensive approach to land management on all U.S. Army installations. It is the U.S. Army's standard for sustaining the capability of installation land units to support their military training missions. The goals of the ITAM program include the following:

1. Achieve optimal sustained use of lands for the execution of realistic training, by providing a sustainable core capability, which balances usage, condition, and level of maintenance.

2. Implement a management and decision-making process which integrates U.S. Army training and other mission requirements for land use with sound natural and cultural resources management.

3. Advocate proactive conservation and land management.

4. Align U.S. Army training land management priorities with U.S. Army training, testing, and readiness priorities. Through the ITAM and its constituent elements (e.g., Range and Training Land Assessment (RTLA) and Land Rehabilitation and Maintenance (LRAM)) Fort Jackson integrates the use of its lands for meeting the current and future military mission and ensuring the conservation of the natural resources on which effective training rely.

3.1.2 Impact to the Military Mission

The military mission at Fort Jackson requires available land for the training of military units. However, the installation must comply with environmental regulations and strive to conserve the natural resources on which effective training rely. Through the coordination of the various environmental programs (e.g., Forest Management, Fish and Wildlife Management) and the ITAM program managers, Fort Jackson ensures the availability of quality training lands and the protection of the natural resources on these lands. During the planning phase of natural resources management or military training the DPW and DPTMS's ITAM Coordinator closely coordinate to ensure the compatibility between the military mission and training requirements, and natural resources. During this planning process, resolutions are established to ensure environmental regulations are being satisfied while still providing sufficient land use to meet the military mission. Further, the DPW coordinates all natural resources management activities with DPTMS Range Operations and the South Carolina Army National Guard's McCrady Training Center to ensure there is no conflict with military training and training areas are enhanced as a result of the natural resources management activity.

3.1.3 Relationship to Range Complex Master Plan

Through the INRMP, planning for both military training activities and natural resources activities are coordinated between DPW and DPTMS. This ensures the military mission is not compromised and Fort Jackson is meeting the mandated environmental regulatory requirements. Through ITAM, environmental resources are considered during the planning of future sites to support the military's missions. Additionally, the DPW considers future range plans when developing natural resources projects, such as establishing habitat management units for the RCW.

3.2 NATURAL RESOURCES CONSULTATION REQUIREMENTS

The Endangered Species Act (ESA) requires Federal agencies to ensure that their activities do not have an adverse impact on any species listed as threatened or endangered by the USFWS. It further requires that Federal agencies implement measures to conserve, protect, and, where possible, enhance any listed species and their habitat.

Fort Jackson coordinates with the USFWS on actions that may affect threatened and/or endangered species. The installation maintains a dialogue with USFWS and conducts numerous informal ESA Section 7 consultations each year. Early informal consultation with the USFWS is the key to resolving potential problems, addressing issues in a proactive and positive manner, and is the preferred method of consultation.

Fort Jackson may determine, through the informal consultation process or simply by the nature of the proposed action, that formal consultation is required for an action. If Fort Jackson determines that an activity may affect a listed species, the installation is required to enter into formal consultation with USFWS to determine whether a proposed action is likely to jeopardize the continued existence of the listed species, destroy or adversely modify designated critical habitats, or potentially result in the incidental take of a species.

The consultation process begins with Fort Jackson's written request and submittal of a complete initiation package and concludes with USFWS's issuance of a biological opinion (BO) and "incidental take" statement, if applicable.

3.3 NEPA COMPLIANCE

The National Environmental Policy Act (NEPA) of 1969 (42 USC 4371 et seq.) is the basic National charter for the protection of the environment. The NEPA established the policy, sets goals, and provides means for carrying out the policy. Federal agencies' actions must comply with the NEPA. The NEPA requires that all Federal agencies involve interested members of the public in their decision-making, consider reasonable alternatives to proposed actions, develop measures to mitigate environmental impacts, and prepare environmental documents which disclose the impacts of proposed actions and alternatives.

Fort Jackson actively incorporates environmental considerations into informed decision-making, in a manner consistent with NEPA and Army regulations (32 CFR Part 651; Environmental Analysis of Army Actions). Communication, cooperation, and, as appropriate, collaboration between government and extra-government entities is an integral part of Fort Jackson's NEPA process. While carrying out this mission, the NEPA program also encourages the wise stewardship of natural and cultural resources for future generations. Fort Jackson decision makers are cognizant of the impacts of their decisions on cultural resources, soils, forests, rangelands, water and air quality, fish and wildlife resources, and other natural resources under their stewardship, and, as appropriate, in the context of regional ecosystems (32 CFR Part 651).

Fort Jackson continuously takes steps to ensure that its NEPA compliance program is effective and efficient. Early integration of the NEPA process into all aspects of Fort Jackson planning prevents disruption in decision-making and ensures that NEPA supports Fort Jackson's planning process and leads to sound decisions. All NEPA analyses are prepared by an interdisciplinary team. When necessary, partnering or coordinating with agencies, organizations, and individuals who have specialized expertise will improve the NEPA process.

Most projects reviewed under the Fort Jackson NEPA program enter the process through the submission of a work request document (DA4283) or a Record of Environmental Consideration (REC). A member of the NEPA staff attends a weekly meeting to review all new work requests submitted. Other actions such as MCA construction, military field training exercises, and plans like the INRMP also undergo NEPA review. On average, Fort Jackson reviews approximately 300 projects annually that results in approximately 95% categorical exclusions and less than 5% environmental assessments (EA). Project reviews, comments, requirements and the administrative records are tracked and recorded in a database maintained by the NEPA program managers.

3.3.1 Public Involvement

The involvement of other agencies, organizations, and individuals in the development of Environmental Assessments (EAs) enhances collaborative issue identification and problem solving. Such involvement demonstrates that Fort Jackson is committed to open decision-making and builds the necessary community trust that sustains Fort Jackson in the long-term.

3.4 BENEFICIAL PARTNERSHIP AND COLLABORATIVE RESOURCE PLANNING

3.4.1 U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) has a field office at Charleston, South Carolina provides technical advice for management of natural resources on Fort Jackson, particularly involving federal-listed species. In addition, Endangered Species Act consultations are performed with the Charleston Field Office. The USFWS is a signatory cooperator in implementation of this INRMP in accordance with the Sikes Act.

3.4.2 South Carolina Department of Natural Resources

The South Carolina Department of Natural Resources (SCDNR) is a signatory cooperator in the implementation of this plan in accordance with the Sikes Act. It is the primary state agency regarding fish and wildlife management on Fort Jackson. Specific cooperation with SCDNR generally involves fish and wildlife management, including game, non-game, and threatened and endangered species management. SCDNR provides technical assistance for the game, non-game, threatened and endangered species, and fisheries management programs. Technical assistance is also available for conservation law enforcement.

3.4.3 South Carolina Forestry Commission

The South Carolina Forestry Commission assists the installation by providing forest fire suppression assistance, and consulting services on forest management issues, such as forest pest management.

3.4.4 South Carolina Department of Parks, Recreation & Tourism, and Palmetto Trails

A Memorandum of Understanding (MOU) between Fort Jackson, the S.C. National Guard, the S.C. Department of Parks, Recreation & Tourism, and Palmetto Trails was established in 1996 to guide the collaborative efforts of establishing and maintaining a section of The Palmetto Trail that traverses Fort Jackson and a part of Fort Jackson licensed to the S.C. Army National Guard (McCrady Training Center). The Palmetto Trail offers public access for natural resources related outdoor activities on Fort Jackson. This collaboration guides the use of and any improvements to the trail to avoid duplication of efforts by the interested parties.

3.4.5 Conservation Organizations

The Longleaf Alliance acts as a clearinghouse of information on longleaf pine, which has been valuable to the installation. The South Carolina Wildlife Federation has shown interest in Fort Jackson’s programs and has presented awards for the installation’s management efforts.

3.4.6 Universities

The University of South Carolina houses the state herbarium including the Fort Jackson collection, and has performed numerous planning level surveys, botanical inventories, and studies on water quality on Fort Jackson. The herbarium is often consulted with on issues related to the flora of Fort Jackson. Additionally, Clemson University has conducted assessments of biological integrity of Fort Jackson's watersheds.

3.5 PUBLIC ACCESS AND OUTREACH

3.5.1 Public Access and Outdoor Recreation

Outdoor recreation enhances the quality of life for military and civilian personnel. As such, Army lands with suitable natural resources are to be managed to allow outdoor recreational opportunities, consistent with the Sikes Act. For the purposes of this INRMP and to be consistent with DoD Directive 7400.4 and AR 200-1, outdoor recreation is defined as recreational programs, activities, or opportunities that depend on the natural environment. Examples include hunting, fishing, and horseback riding, picnicking, bird-watching, hiking, and camping. Developed or constructed facilities and activities, such as golf courses, tennis courts, baseball facilities, etc., are not included.

A basic tenet of ecosystem management is the "human values and use" component. Fort Jackson's natural resources based outdoor recreation program uses ecosystems in terms of both products (i.e. game species) and disturbance associated with persons in the outdoors. Fort Jackson is well aware of the over-riding need to ensure these activities do not significantly impact overall ecosystem integrity. Special consideration is given to protection of critical areas (endangered species habitat, highly erodible areas, etc.) from negative impacts due to outdoor recreation.

The military mission has priority over outdoor recreation involving range access. If outdoor recreational activities are to continue to thrive on Fort Jackson, this military mission priority must not be compromised. If recreational or management activities conflict with military activities, the military mission comes first.

Public Access

Department of Defense Instruction 4715.03, *Natural Resources Conservation Program*, March 18, 2011, states, "DOD installations shall be available to the public for hunting where such programs exist and when not in conflict with mission or environmental and natural resources conservation program goals".

Paragraph 4-3, d. (9)(e) of Army Regulation 200-1, *Environmental Protection and Enhancement*, states: Provide access to uniformed personnel, family members, and the public to hunting, fishing, and trapping, consistent with security requirements and safety concerns.

Fort Jackson limits access for hunting and fishing to authorized personnel only. While unsupervised use by the general public is prohibited, Fort Jackson does allow non-affiliated civilians of the general public to participate in hunting and fishing activities when sponsored and

supervised by an authorized participant. Authorized participants include: All active duty personnel, military retirees, DOD appropriated funded and non-appropriated funded personnel, reservists, National Guard, and family members of the above, DOD contractor employees, technical representatives and employees of military banking facilities working on Fort Jackson as determined by the Installation Commander, and the general public to participate in specific supervised hunting and fishing events as organized by DFMWR.

Limiting public access for hunting and fishing is necessary for various safety reasons. Non-affiliated civilians are relatively un-initiated with respect to military-specific safety concerns and are at a greater risk. There are numerous safety hazards including:

1. Live fire of small arms and large weapons on ranges, the use of high explosives for demolition training, and artillery live-fire from firing points within training areas into designated impact areas. These ranges, firing points and impact areas have no physical barriers to prevent entry down-range into the hazardous areas.

2. Numerous off-limits areas totaling approximately 6,000 acres that contain unexploded ordnance (UXO). These UXO areas are insufficiently marked and lack physical barriers to prevent entry.

3. Day and night-time heavy tracked and wheeled vehicle movement on and off-road.

4. Unmarked military training areas, unmarked concertina wire from military training, and a network of unmarked roads that are often washed out and impassable,

Furthermore, there is no separation of the hunting and fishing areas from areas designated and utilized for various military training activities. This further warrants restricting the general public from utilizing these lands for the safety reasons listed above.

In addition, Fort Jackson's primary mission of Initial Entry (Basic) Training results in large numbers of Soldiers-in-Training occupying the ranges and training areas each day. There is a high likelihood of hunters and anglers encountering these Soldiers-in-Training. This presents greater opportunities for illegal associations, as defined by Fort Jackson Regulation 600-3. Illegal associations are harmful to mission accomplishment and degrade the ability to develop military skills, motivation, discipline and confidence in Soldiers-in-Training.

Finally, allowing general public access to Fort Jackson for hunting and fishing would require additional efforts for background checks, weapons registrations, and administration of hunters and anglers. Fort Jackson's current staffing and resources necessary to perform these requirements cannot accommodate the increased demand.

Public access for non-consumptive natural resources related activities is also available on the section of the Palmetto Trail, which traverses Fort Jackson along the southern boundary. Through a Memorandum of Understanding (MOU) between Fort Jackson, the South Carolina National Guard, the South Carolina Department of Parks, Recreation & Tourism, and the Palmetto Trails (Palmetto Conservation Foundation), this section of trail offers the public opportunities for hiking,

mountain biking, wildlife viewing and access to an interpretive trail. This interpretive trail, named the Harry J. Vann Interpretive Trail, was developed by the S.C. National Guard in 2000 in celebration of National Public Lands Day. The purpose of this trail is to help educate and provide recreational opportunities to the citizens of South Carolina. This trail provides Fort Jackson and the S.C. National Guard an opportunity to share this land and our conservation ethic.

3.5.2 Public Outreach

To increase awareness of the importance of ecosystem management, Fort Jackson fosters citizen participation in ecosystem education and stewardship, and participates in regional stewardship/research programs. This includes educational activities with local organizations such as Scout troops, environmental groups, conservation clubs, and school groups.

Every other month the Environmental Division conducts an Environmental Compliance Officer's Course that includes natural resource presentations. Approximately 300 individuals receive this training annually. The Environment Division also sponsors Earth Day activities each April with nature walks, litter clean-up days, natural resource presentations, and other activities. The South Carolina Master Naturalists class has held a field trip on Fort Jackson for the past two years as part of their training certification. The Wildlife Branch has hosted meetings of the South Carolina Chapter of The Wildlife Society on Fort Jackson with approximately 100 members in attendance. A children's fishing rodeo has been held at Semmes Lake in cooperation with the Fort Jackson Directorate of Family and Morale, Welfare, and Recreation. Environmental Division personnel also write natural resource articles for The Fort Jackson Leader newspaper.

The Harry J. Vann Interpretive Trail (a spur of the Palmetto Trail) contains several interpretive signs and an outdoor classroom available for public use.

3.5.3 Native American Access

Fort Jackson has conducted eight formal consultations with 13 federally recognized Native American Tribes and Nations between 2001 and 2015. There have been no sites or resources of religious importance identified on Fort Jackson by Native Americans, thus no requests for access have been received to visit such sites or collect such resources.

Resulting from these consultations, Native American have expressed some minor interest in certain native plants found on Fort Jackson. Access for the purpose of collecting botanical materials is accommodated by granting a license approved by the installation's Garrison Commander, and by providing an escort for the individuals entering Fort Jackson. Prior to the collection of any botanical materials, a Minor Forest Products License will be granted by Fort Jackson. The proposed collection of any botanical materials will be assessed for potential adverse effects to the local populations of the target species. No species listed as At-risk, candidate, threatened or Endangered will be collected unless authorized and or permitted by the SCDNR and the USFWS.

3.6 ENCROACHMENT PARTNERING

The Department of Defense's presence in the Midlands of South Carolina is significant.

There are five military installations; three active duties and two National Guard. Active and reserve components of the Army, Navy, Air Force and Marines utilize these bases. To reduce development related pressure, the installations are working together to leverage our presence in regional decision making. Specifically, the South Carolina Military Department, Fort Jackson, and Shaw Air Force Base have joined together with local governments and Non-Governmental Organizations (NGO) to form the Midlands Area Joint Installation Consortium (MAJIC). The purpose of the Consortium is to facilitate collaboration on projects including a region-wide Joint Land Use Study (JLUS) or the implementation of Joint Compatible Use Buffers (JCUB) program.

Joint Land Use Study

Members of regional and local governments, along with US Army, US Air Force, South Carolina Air National Guard, and South Carolina Army National Guard representatives joined in initiating this effort to study current development issues, growth trends, and evolving mission needs and to strengthen land use planning around the installations.

Conservation Strategies

As part of this strategy, the Midlands Area Joint Installation Consortium (MAJIC) has partnered with the Department of Defense (DoD) and the Congaree Land Trust and Conservation Fund to explore the purchase of conservation easements from willing property owners within priority acquisition areas identified by the JCUB (Joint Compatible Use Buffer) study completed in September 2007. MAJIC has identified priority areas northeast and south of Fort Jackson and all around McEntire JNGB. The ACUB (for purposes of the Midlands initiative the program is referred to as JCUB) program has emerged as one of the most effective of the DoD sustainability initiatives in preventing encroachment around installations. The core implementation strategy of the program is to acquire conservation easements that prohibit incompatible development in perpetuity, while allowing the land to remain in private hands. While the restrictive covenant prohibits urban development, it accommodates low impact uses such as farming and forestry that do not pose a risk of interference with nearby training activities. MAJIC is a strong alliance promoting the conservation of the local environment and the sustainability of the regional installations. Local governments and the individual installations can also participate in the conservation process by acting as direct cost-sharing partners in conservation easement purchases. Jurisdictions can also align their infrastructure and land use policies to reinforce the rural/agricultural character of areas near or within the designated JCUB, thus reducing development pressures and limiting price escalation of the land (FJ JLUS).

3.7 STATE COMPREHENSIVE WILDLIFE PLANS

3.7.1 Sandhills Ecoregion

Fort Jackson is part of the Sandhills Ecoregion as identified in The South Carolina Comprehensive Wildlife Conservation Strategy (CWCS). The actions identified in the Fort Jackson INRMP complement the priorities established in the CWCS for this ecoregion. Longleaf pine restoration, endangered species conservation, and the use of prescribed fire all contribute to the objectives identified in the CWCS. Fort Jackson will continue its cooperative relationship with the SCDNR

in identifying, prioritizing, monitoring and conserving to the extent practicable the high priority species and habitats identified in the S.C. State Wildlife Action Plan that may be found on Fort Jackson.

3.8 CLIMATE CHANGES IMPACTS TO NATURAL RESOURCES

The June 2014 Department of Defense (DOD) Climate Change Adaptation Roadmap provides insight into how climate change may affect missions worldwide. Initial analysis indicates that four primary climate change phenomena are likely to affect the DOD's activities:

• Rising global temperatures

• Changing precipitation patterns

• Increasing frequency or intensity of extreme weather events

• Rising sea levels and associated storm surge.

Based on information within this document, climate changes at Fort Jackson may affect natural resources and their management along with military training. Increased temperature trends are anticipated along with changes in the fire regime. There may be an increased number of 'black flag' (suspended outdoor training) or fire hazard days. Drought conditions may increase the number of wildfires and limit the number of days prescribed burns can be conducted.

Climate change may stress threatened and endangered species and related ecosystems, on and adjacent to the installation, which may result in increased endangered species and land management requirements. In addition, species movements and habitat shifts may occur which will influence the monitoring and management of plants and animals on Fort Jackson.

Increased dust may result during drought conditions; and, there is also the possibility of erosion and flooding damage during high rainfall events such as hurricanes. These changes will increase maintenance/repair requirements for training/testing lands, forested lands, roads, ranges, and ponds.

Increased ecosystem, wetland, sensitive species, and non-native invasive species management challenges are also anticipated. This includes the management of natural infrastructure assets, including unique landscapes, ecosystems and habitats, particularly those supporting sensitive species. Fort Jackson's Longleaf ecosystem which supports the endangered Red-cockaded woodpecker and a diversity of other plant and animal species may be affected.

As climate science advances, the DOD will regularly reevaluate climate change risks and opportunities in order to develop policies and plans to manage its effects on the DOD's operating environment, missions, and facilities. The DOD will review and, as needed, make changes to existing plans, policies, programs, and operations to incorporate climate change considerations. Fort Jackson will stay current with all regulations, policies, and guidelines on climate change and will adjust natural resource management to be in compliance.

Fort Jackson will be involved with agencies and organizations to address climate changes. The installation natural resource management staff will particularly work closely with the USFWS and the SCDNR on climate change issues.

The SCDNR has developed a document entitled *"Climate Change Impacts to Natural Resources in South Carolina"*. This document provides a look into how climate change may affect management of habitats and species in the state, and is applicable to Fort Jackson.

Adaptive management approaches are the foundation for sustainable use of natural resources to support mission needs, meet stewardship requirements, and contribute to ecosystem resilience in the face of climate change. Maintaining ecosystem resilience is a key adaptation strategy given the uncertainty of potential climate change impacts.

4.0 PROGRAM ELEMENTS

4.1 THREATENED AND ENDANGERED SPECIES MANAGEMENT AND SPECIES BENEFIT, CRITICAL HABITAT, AND SPECIES OF CONCERN MANAGEMENT

Critical habitat has not been designated for the three endangered species known to be present on Fort Jackson.

The conservation of these three listed species is described in the Endangered Species Management Component for the Red-cockaded Woodpecker (Appendix 2) and the Endangered Species Management Component for Smooth Coneflower and Rough-leaved Loosestrife (Appendix 3).

4.2 WETLANDS, FLOODPLAINS AND DEEP WATER HABITATS MANAGEMENT

The discussions on Wetlands and Deep Water Habitat, and Floodplains have been consolidated into one discussion for the purpose of this INRMP. This is a slight modification from the DoD INRMP template that suggests separate discussions for Wetlands and Deep Water Habitat, and Floodplains. This modification was done to consolidate all water resources into one section.

4.2.1 Objectives

Wetlands, floodplains, and stream buffers are critical in the protection and maintenance of living resources. Wetlands are also important in the protection of surface waters in accordance with the Rivers and Harbors Act of 1899; Executive Order (EO) 11990, Protection of Wetlands; Sections 401 and 404 of the CWA; and presidential policy mandating "no net loss" of wetlands (National Policy Issuance #91.01, Wetlands). Meeting the President's challenge, the U.S. Army has a mandate to protect wetlands, to the maximum extent practicable. The following regulations, laws and EOs are pertinent to wetlands, floodplains, and stream buffers for the state of South Carolina:

EO 11990 Protection of Wetlands
Section 401 of the CWA
Section 404 of the CWA
Coastal Zone Management Act of 1972

EO 11988—Floodplain Management
South Carolina Stormwater Management and Sediment Reduction Act of 1991

U.S. Army policy is to avoid adverse impacts to existing aquatic resources and offset those that are unavoidable. The U.S. Army's goal is no net loss of values and functions to existing wetlands and no overall net loss of wetlands on U.S. Army controlled lands. Furthermore, the U.S. Army takes a progressive approach to protecting existing wetlands, rehabilitating degraded wetlands, restoring former wetlands, and creating wetlands to increase the quality and quantity of the Nation's wetlands resource base. Similarly, EO11988–Floodplain Management addresses floodplain impacts, and the Coastal Zone Management Act mandates consistency with state coastal zone regulations, if applicable. Fort Jackson is not within the South Carolina coastal zone; therefore, there is no compliance issue with this resource.

4.2.2 Wetland Management

Fort Jackson will identify and maintain a current inventory of wetlands and surface water resources through Planning Level Surveys. A Memorandum dated 21 March 1997, Army Goals and Implementing Guidance for Natural Resources Planning Level Surveys and INRMP provides guidance for planning level surveys. The following steps will be taken by Fort Jackson to mitigate the effects of specific projects on wetlands:

1. Through early planning, coordination, and NEPA reviews, decide whether alternatives are available that do not impede wetlands. Avoiding or reducing the amount of wetlands affected by the action often economically benefits the U.S. Army.

2. The United States Army Corps of Engineers (USACE) Charleston District will determine the boundaries of affected wetlands through wetland delineations.

3. When all wetland information is assembled, request that the USACE determine whether the wetland is jurisdictional and whether a Section 404 Permit is required. If the site requires a Section 404 Permit, a detailed design and permit application will be prepared and the Section 401 Water Quality Certification application will also be submitted.

4. If the wetland is jurisdictional, obtain a Section 404 permit from USACE before performing any work associated with the discharge of dredged or fill material into the wetland.

5. During the planning stages and NEPA process, the environmental staff determines whether any other laws or regulations apply to a proposed action in a wetland. This focuses on the ESA and MBTA. Regarding the ESA, if an action may affect a listed species, consultation with the USFWS is initiated.

6. The environmental staff determines whether a Nationwide Permit might apply to the intended action. They also determine whether the state requires a Section 401 Water Quality Certification and or the locality has individual permit requirements related to watershed, wetland, or stream quality.

7. If the project requires Section 404 permits, the environmental staff will demonstrate avoidance and minimization of wetland impacts followed by mitigation as a last resort, per the Memorandum of Agreement (MOA) between USACE, Environmental Protection Agency (EPA), and USFWS.

In addition to complying with regulatory requirements related to jurisdictional wetlands, Fort Jackson will, to the greatest extent practicable, identify and conserve small isolated ephemeral wetlands which serve to enhance biodiversity and may serve as critical areas for amphibians and reptiles.

4.2.3 Floodplains Management

Executive Order 11988 requires all Federal agencies to provide leadership and take action to reduce the risk of flood loss; minimize the impacts of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values of floodplains when acquiring, managing, or disposing of Federal lands. Prior to implementing a proposed action, Fort Jackson's planners consult the National Flood Insurance Program (NFIP) maps distributed by the Federal Emergency Management Agency (FEMA) to determine if the proposed action occurs in a floodplain. If NFIP maps do not cover the affected area, a professional engineer prepares floodplain map contours. Fort Jackson implements the floodplain requirements through planning review and stormwater management programs. The erosion and sediment programs of the state and local issuing authorities review all development and prevent construction of structures within critical floodplains. Additionally, Fort Jackson hydrologic/hydraulic study maps and the project's storm magnitude severity are reviewed to determine potential impacts to floodplains. The following steps are taken to minimize impacts to floodplains:

1. Through NEPA and early project planning stages, decide if projects are located in a floodplain. Investigate alternatives that are available to relocate the project.

2. Fort Jackson will determine the boundaries of the floodplain in accordance with the Fort Jackson hydrologic/ hydraulic study or the FEMA floodplain maps.

3. Assemble all pertinent associated material, including aerial images and maps (topographical, etc.).

4.2.4 Deepwater Habitat

A total of 29 impoundments are located on Fort Jackson. The Fort Jackson Wildlife Branch is responsible for the management of natural resources associated with these impoundments on the installation, and management guidelines are provided Section 4.4.6 of this INRMP.

4.2.5 Stream Buffer Management Zones

The South Carolina Stormwater Management and Sediment Reduction Act of 1991 establishes minimum standards and procedures for a statewide stormwater management and sediment reduction program. While it has no specific provisions for riparian forest buffers, it does establish

that land disturbing activities one acre and greater must submit a stormwater management and sediment control plan and obtain a permit to proceed from South Carolina Department of Health and Environmental Control (SCDHEC). This Act does not included agricultural or forest land used for timber harvest.

Land disturbing projects on Fort Jackson are reviewed through the NEPA evaluation process to determine if a stormwater management and sediment control plan is needed. If needed, one is prepared and a permit to proceed is obtained from the SCDHEC.

Timber harvesting actions performed on Fort Jackson comply with practices outlined in the Best Management Practices for South Carolina's Forest Wetlands and requirements of Section 404 of the Clean Water Act.

4.3 ENFORCEMENT OF NATURAL RESOURCES LAWS AND REGULATIONS

The installation's Garrison Commander has the authority and responsibility to enforce natural resource laws under 16 USC § 670a (b) (3) (A), 10 U.S.C. § 2671(c), and AR 200-1.

Enforcement of natural and cultural resources laws are a vital aspect of management. Rules and regulations are developed to protect rare or unique species, protect sensitive areas and keep sportsmanship an active part of hunting, trapping and fishing.

Pursuant to the Garrison Commander's inherent responsibility to provide for the safety and security of the installation, Fort Jackson Conservation Law Enforcement Officers (CLEOs) are duly commissioned law enforcement officers specially trained and delegated the authority to enforce all natural and cultural resource laws, statutes and regulations on Fort Jackson. CLEOs are assigned to the Directorate of Emergency Services (DES).

CLEOs support Fort Jackson's mission by conducting law enforcement patrols and investigations; providing for the safety of recreationists and military users of the land; conducting federal and state license compliance inspections to ensure recreational users are properly authorized to hunt and fish on the installation and comply with all wildlife related laws and regulations; maintaining a proactive environmental and wildlife education program to deter intentional or inadvertent violations of the law; and assisting the installation's requirement to meet natural resource objectives as outlined within this Plan. Department of Defense Instruction (DODI) 5525.17 lists the responsibilities and procedures of CLEOs on Fort Jackson.

Natural resources enforcement on Fort Jackson occurs year-round, with particular emphasis on the various hunting and fishing seasons.

4.4 FISH AND WILDLIFE MANAGEMENT

4.4.1 Management Plan

Fort Jackson's fish and wildlife management actions contained in this plan are based on sound scientific research and history of past management success at Fort Jackson. Biodiversity and ecosystem management strategies are incorporated in this multiple land use management plan.

4.4.2 Management History

A detailed discussion of the history of natural resources management at Fort Jackson is provided in Section 2.1.3.3 of this INRMP.

4.4.3 Management Goals and Objectives

4.4.3	FISH and WILDLIFE MANAGEMENT GOALS and OBJECTIVES
Goal 1:	Maintain Viable Populations of all Native Species In-Situ.
Objective 1.1:	Maintain and manage all populations of wildlife, game, nongame, threatened and endangered species on Fort Jackson.
Objective 1.2:	Maintain and manage fisheries in the waters of Fort Jackson to allow for recreational harvest of fish.
Objective 1.3:	Maintain and manage wildlife game species on the lands of Fort Jackson to allow for the recreational harvest of game.
Goal 2:	Represent, Within Protected Areas, All Native Ecosystem Types Across Their Natural Range of Variation.
Objective 2.1:	Integrate ecosystem management and multiple land use strategies in the actions taken on Fort Jackson, in accordance with DoD and U.S. Army policy.
Goal 3:	Maintain and Mimic Ecological Processes (*i.e.* disturbance regimes, hydrological processes, nutrient cycles, etc.).
Objective 3.1:	Maintain and enhance water quality and protect wetland habitats.
Objective 3.2:	Maintain and manage the land on Fort Jackson to provide a variety of habitat types to allow for greater species diversity.
Objective 3.3:	Accommodate human use and occupancy within the constraints of military training, hunting and fishing, other recreational uses, and forest product harvests.
Goal 4:	Manage the Lands of Fort Jackson IAW all Applicable Federal and State Laws and U.S. Army Regulations and Policies.
Objective 4.1:	Coordinate and consult with State and Federal natural resources agencies on management of game species of fish and wildlife.
Objective 4.2:	Maintain and update the Fort Jackson hunting and fishing regulation.
Goal 5:	Monitor and Research Management Activities to Quantify Effectiveness of Actions and Incorporate Scientifically Proven Methods Used by Wildlife Managers.
Objective 5.1:	Monitor flora and fauna populations.
Objective 5.2:	Partnership with DPTMS and state universities.
Goal 6:	Provide Technical Assistance and Education Programs to Local Community on Fish and Wildlife Management and Activities Occurring on Fort Jackson.

4.4.4 Fish and Wildlife Resources

4.4.4.1 Fisheries

Abundant fishing opportunities exist both in the cantonment area and the training areas of Fort Jackson. Water bodies in the training areas include; Boyden Arbor Pond, Upper Barstow Pond,

Lower Barstow Pond, Clark Pond, Cobb Pond, Messer's Pond, Odom Pond, Davis Pond, Chaver's Pond, Dupre Pond, and South Pond. These ponds are all fed by Colonel's Creek or Gill's Creek, or a tributary associated with one of these streams. The primary fish species in these ponds are largemouth bass, bluegill, and redear sunfish (shellcracker), but many other species are present. Other fish that are routinely caught include redbreast, crappie, and chain pickerel. These fisheries are not intensively managed, but supplemental fish stocking and aquatic vegetation control do occur as the need arises and when resources are available. Some of these ponds are also utilized as waterfowl areas and undergo water level manipulations as a result. Cantonment area waters include Semmes Lake, Upper Legion Lake, Lower Legion Lake, Arrow Head Pond, Mill Pond, Twin Lakes, Golf Course Ponds 1, 2, and 3, Catfish Pond, Price's Pond, Heise's Pond, and Varn Lake. These fisheries are more intensely managed because they are more accessible to anglers and therefore more heavily utilized. Ponds are stocked with Bluegill (bream), Redear Sunfish (shellcracker), Largemouth Bass, and occasionally Channel Catfish. Stocked ponds are closed to fishing until the fishery is established, and then creel limits are used to prevent over-fishing. Heavier emphasis is also placed on aquatic vegetation management in these ponds. One large lake is also located on the installation. Weston Lake is considered a self- sustaining fishery due to its size.

4.4.4.2 Streams and Creeks

In addition to the lakes and ponds there are also two major creek systems on Fort Jackson, Colonel's Creek and Gill's Creek. These creeks offer fishing opportunities for red breast, bass and other species.

4.4.4.3 Potential for Fisheries

Experience has shown that managing fisheries associated with large stream systems is very difficult. Due to limited resources and a lack of success in the past, fishery management on training area waters will continue to be less than that of cantonment area waters. Since cantonment area waters are also much more heavily utilized by anglers, fish stocking and aquatic vegetation management efforts will be focused in these areas. The need for stocking will be determined through balance checks conducted with seine nets and/or fish traps. Creel limits and re-stocking rates will be applied accordingly. Vegetation management will be achieved primarily through aquatic herbicide applications and the introduction of sterile grass carp. These waters have and will continue to provide the opportunity for successful fishing.

4.4.4.4 Game Species

Fort Jackson is inhabited by wildlife species typical of the sandhills and upper coastal plain regions of South Carolina. Many of these species are actively managed for sport hunting and fishing (see Table 4.1 below).

Table 4.1.Wildlife and Fish Species Commonly Pursued on Fort Jackson

Common Name	Scientific Name
Birds	
Wood Duck	Aix sponsa
Canada Goose	Branta canadensis
Eastern Wild Turkey	Meleagris gallapavo
Bobwhite Quail	Colinus virginianis
Mourning Dove	Zenaida macroura
Mammals	
White-tailed Deer	Odocoileus virginianus
Eastern Gray Squirrel	Sciurus carolinensis
Eastern Fox Squirrel	Sciurus niger
Racoon	Procyon lotor
Fish	
Largemouth Bass	Micropterus salmoides
Bluegill	Lepomis machrochirus
Redear Sunfish	Lepomis microlophus
Channel Catfish	Ictalurus punctatus

4.4.4.5 Non-Game Species

South Carolina state law prohibits the taking of most non-game wildlife. Armadillos (Dasypus novemcinctus), Coyotes (Canas latrans), and Feral Hogs (Sus scrofa) are not considered game animals in South Carolina or on Fort Jackson. These animals may be harvested on Fort Jackson during any hunting season within the legal parameters of that season. In addition, year-round hunting for these species is allowed, and is defined in the Fort Jackson Hunting and Fishing Regulation (FJ 28-4).

Enforcement of regulations, prescribed burning, forest management, and management of wildlife openings are some of the tools used for management of non-game species on Fort Jackson. Other actions that benefit non-game species include the placement and maintenance of artificial nest structures and the planting of vegetation that benefit both game and non-game wildlife. Fort Jackson maintains nesting structures for American Kestrel (Falco sparverius), Purple Martin (Progne subis), and Eastern Bluebird (Sialia sialis.) and participates in non-game bird surveys and monitoring.

4.4.5 Hunting and Fishing Program

4.4.5.1 Fort Jackson Access for Hunting and Fishing

The regulations regarding the Hunting and Fishing Program are defined in Fort Jackson Regulation 28-4. Safety, security, and the sustainability of natural resources are the primary concerns of the Fort Jackson Hunting and Fishing Program. Therefore fishing and hunting access is restricted to

the following groups of individuals: All active duty personnel, military retirees, DOD appropriated and non-appropriated funded personnel, reservists, National Guard, and family members of the above, DOD contractor employees, technical representatives and employees of military banking facilities working on Fort Jackson as determined by the Installation Commander, and the general public to participate in specific hunting and fishing events or programs as organized by DFMWR. In addition, persons authorized to purchase Fort Jackson hunting and fishing permits may bring non-affiliated guests.

4.4.5.2 License Sales

As set forth in AR 200-1 fees are collected in the form of Fort Jackson hunting and fishing permits. All fees collected will be accounted for in accordance with guidance provided for the appropriation titled Wildlife Conservation Military Installations, Army account 21X5095 (AR 37-100 and 37-108). These funds (21X funds) may be used only for fish and wildlife management on the installation where they were collected. Funds required to administer the collection of these funds will not exceed 10% of the annual revenues from hunting and fishing permit sales. Licenses are sold by DFMWR. Qualified personnel must possess both applicable state and Fort Jackson licenses to legally hunt or fish on the installation.

4.4.6 Fisheries Management

4.4.6.1 Lime and Fertilizer

Lime and fertilizer may be applied to increase productivity of certain ponds. Most ponds on Fort Jackson exist on streams that have a relatively high rate of flow. Maintaining a good phytoplankton bloom with the application of lime and fertilizer can be difficult and expensive. Only a few ponds have characteristics which make them suitable for lime and fertilizer applications.

4.4.6.2 Aquatic Weed Control

Aquatic weeds will be controlled using the integrated pest management approach. This approach implements the most effective, inexpensive and most current scientific methods available. Aquatic weeds are recognized as a natural and necessary part of a lake ecosystem and will only be treated when their growth becomes excessive. Several methods under the integrated pest management philosophy will be used to help control the aquatic vegetation in the ponds. A brief description of methods to be used follows:

1. Winter Draw Down - In the fall of the year, water levels may be reduced to expose the weeds to freezing and drying conditions. This will also help in driving small baitfish out into open water and increase the food source for game fish over the winter months. Levels will be restored in the spring of the year as fishing pressure begins to increase in the ponds and as spawning seasons begin. Water bodies utilized as waterfowl areas will not undergo this type of treatment. Instead, a moist soil management program may be implemented.

2. Chemical – Chemical herbicide applications should be used as early in the spring as possible to bring aquatic vegetation under control before a complete infestation has occurred. Appropriate aquatic herbicides will be applied as needed to control weeds during the spring and summer months. Product label instructions will be followed and the chemical application will comply with all DoD and EPA requirements. Usually only a small portion of the lake will be treated at any one time to protect against lowering oxygen levels and causing fish kills. Treated lakes will be closed to fishing during the application and for the required time in accordance with the herbicide label.

3. Biological control (grass carp) – Triploid Grass carp (Ctenopharyngodon idella) may be added to some ponds on a limited basis to reduce aquatic vegetation. Triploid fish are stocked preventing the natural reproduction of the species. Fish are purchased from a local certified supplier who can provide certificate of triploidy.

4.4.6.3 Cover\Fish Attractors

Fish attractors in ponds can benefit all species of fish. Benefits include the aggregation of baitfish, additional substrate for aquatic invertebrate production, increased spawning habitat, and shelter. Some of the cantonment area ponds on Fort Jackson lack structure that would be used as cover by fish species. Several types of fish attractors may be used at Fort Jackson including sunken Christmas trees, PVC structures, and pallets. Attractors will be marked with buoys anchored near the attractor site to allow anglers to locate and fish on the sites. Fish attractor site selection is based on the amount of naturally occurring structure, water depth, pond size and angler use.

4.4.6.4 Population Census

Fish population sampling has traditionally emphasized ponds and lakes under management. Sampling is conducted from April to September to evaluate the presence and relative abundance of largemouth bass and bream reproduction; the presence and relative abundance of intermediate-sized bream and bass; the condition of all species; and the presence and relative abundance of competitive nongame species.

Several methods will be used to estimate the number, species composition, and age class of fish in Fort Jackson lakes and ponds. This is required to make decisions on management of the fisheries resources. Some of the following methods may be used:

1. **Creel surveys**: these surveys can be an integral component of managing recreational fishing. Creel surveys can assess:

a) Quality of sport fishing, expressed as species caught and number and weight of fish caught per unit of fishing effort;

b) Fishing pressure, expressed as angler-hours of fishing effort for all species or separate species;

c) Total yield of fish in terms of species numbers and weights for specific segments of time;

d) Composition of the catch, as a percentage of total numbers, and weights for various species and classes of fish;

e) Characteristics of the fishery, such as socioeconomic information about the angling population and value of the fishery to surrounding communities;

f) Statistics about the fishing population, such as annual exploitation rate of various year classes of selected species, appraisal of new year classes recruited into the fishery, and population estimates and mortality rates for selected species;

Creel surveys must be repeated periodically to observe trends and record changes that may impact the fishery. Changes in fisheries management may be required to keep abreast of changes in fishing pressure, catch rates, etc. as determined from survey results. Creel surveys can also measure effects of management techniques, such as drawdown, fish population control actions or fishing regulations. Finally, creel surveys furnish information of interest to anglers that may aid them in their own fishing efforts. The creel survey must be statistically valid and cost effective. Survey design should be based on random sampling. The survey should incorporate a stratified sampling scheme to increase the homogeneity of each sampling unit. Because of time, cost, and logistical constraints, it may be necessary to divide the fishery into smaller units with different sampling probabilities. Such a design can minimize cost and labor and increase survey precision. Survey types include roving creel or access point surveys, telephone surveys, questionnaires, or combinations thereof.

Basket Survey

Baskets or traps will be used by biologists to catch species not usually caught in other survey methods. This helps to alert them to the presence of unwanted species.

Seine Net Survey

The balance between predator and prey species may be monitored by biologists using seine nets. A seine haul consists of anchoring one end of the seine at the bank and pulling the other end straight out into the water to full length and sweeping back to shore in an arc, thus sampling a quadrant. Fish in the sample are identified to species and counted and weighed.

4.4.6.5 Sportfish Management

In order to improve fish populations and angler success on Fort Jackson, the following general measures may be taken:

1. The daily creel limit on all lakes and ponds on Fort Jackson are as follows: Bass – 3 per person, Other Game Fish (as defined in the South Carolina Hunting and Freshwater Fishing Rules and Regulations) – 15 per person, Catfish – 3 per person, Non-Game Fish (except grass carp and catfish)- no limit. There are no size limit restrictions on fish harvested on Fort Jackson. Creel limits are listed in Fort Jackson Regulation 28-4.

2. Supplemental stocking of catfish has been conducted in several lakes to increase angler success for these species.

3. Herbicide treatments for weed control will continue in lakes.

4. Structure may be added to lakes that have little or no natural features. This will include natural structure such as Christmas trees and man-made objects such as freshwater fish attractors.

4.4.6.6. Drain and Restock

When survey results indicate that the fish population of a lake is extremely out of balance or when the number of game species becomes too low, the lake may be drained and restocked. The cost and required resources of draining and restocking will have to be considered due to various factors, including the condition of water control structures.

Stocking - Bass, Bream and Catfish Lakes: Rates of stocking are determined by management practices to be carried out. The recommended rates for initial stocking for fertilized vs. unfertilized lakes are listed in Table 4-2.

Table 4-2. Stocking Rates for Fertilized and Unfertilized Ponds

Species	Rate per surface Acre for a Fertilized pond	Rate per surface acre for a Unfertilized pond
Bream (Bluegill 70 percent) (Redear sunfish 30 percent)	1000	500
Largemouth bass	100	50
Channel catfish	100	50

4.4.6.7 Feeding

Automatic feeders can provide 3 percent of the fish body weight in food on a daily basis, which is the desired rate of feed. Feeders may be placed on certain ponds if resources become available. This will allow for fast growth of fish and better sport-fishing opportunities in these lakes.

4.4.6.8 Fish Consumptions Guidelines

Current fish consumption guidelines are published by the South Carolina Department of Health and Environmental Control.

4.4.6.9 Fish Kill Investigations

Fish kills (observed deaths of fish) in most cases are caused by natural events, however, because these events are often very visible, they can cause considerable concern within the Fort Jackson Community. There may be a single or a combination of causes for fish kills. It is therefore

important that information recording and sample collection is carried out as described within the program manual. With accurate information and suitable samples the cause of a fish kill can be rapidly determined. The DPW Environmental Division is the lead organization to respond to reports of fish kill on Fort Jackson. It will liaise with other relevant organizations including the South Carolina Department of Health and Environmental Control (DHEC), SCDNR, and the U.S. Fish and Wildlife Services.

What is a Fish Kill?

A 'Fish Kill' is a sudden death of a large number of aquatic animals including fish, prawns and crabs (Department of Health and Environmental Control). Fish kills usually take place in a defined area and over a short period of time.

Causes of Fish Kills

Fish kills may be entirely due to natural causes or in some way due to human activity. This manual describes some of the common causes of fish kills and the possible associated conditions.

a) Low dissolved oxygen levels

Low dissolved oxygen levels are probably the most common cause of fish kills. The depletion of oxygen may result from several causes, but are usually due to the use of oxygen by organisms such as algae, aquatic plants (at night), or bacteria in the presence of organic matter. Situations that may lead to oxygen depletion include:

- Discharges of organic matter (i.e. sewage);
- Anaerobic mud stirred up from the bottom;
- Rapid turnover of a stratified waterbody;
- Decaying macrophytes and algal blooms

The ability to tolerate low dissolved oxygen levels depends on the species of fish and their size. The response of fish to low dissolved oxygen levels is to gasp at the surface in an effort to force oxygen across the gills.

b) Rain and run-off

Heavy rainfall and subsequent flooding may wash organic matter such as leaf litter and other plant material, animal manure and organically rich soils into the water bodies. This promotes increased bacterial decomposition and may result in the depletion of oxygen. Fish kills during the late build up and early wet season are often caused by this post run-off deoxygenation. Run-off may also carry potential toxic material including oils from the roadways, contaminated soils (i.e. pesticides and insecticides), toxic spills and acid sulphate soils.

c) pH stress

pH is the measure of water acidity and can vary greatly in the natural environment. Generally, freshwater streams are slightly acidic whereas estuarine water bodies may be slightly alkaline. Sudden changes and extremes in pH (i.e. acidic or alkaline) may be lethal to fish, either directly or indirectly through the mobilization of heavy metals from soils. In extreme cases, acidic "burning" of the gills indicated by, brown discoloration of the gills or excessive mucous secretion may be evident on the affected fish. The change in pH levels can occur naturally, through runoff from acid-sulphate soils or artificially through industrial effluent, contaminated runoff and acid or alkali spills (Department of Health and Environmental Control).

d) Excessive plant growth

Excessive aquatic plant growth due to increased nutrient concentration in waterways can cause fish kills through super saturation of oxygen during the day or the depletion of oxygen during the night (Department of Health and Environmental Control). The plants, including algae, produce oxygen during daylight hours (photosynthesis) and consume oxygen at night (respiration). Although oxygen is produced during the day, the consumption of oxygen during the night may be such that oxygen levels are depleted to a level lethal to fish. Another problem with excessive plant growth is that during periods of die-off, the increased organic loading is consumed by increasingly large numbers of bacteria. The bacteria's high oxygen requirements can quickly lead to anoxic conditions resulting in a fish kill. Increased nutrients may also cause algal blooms. The majority of algal blooms appear to be harmless but under exceptional conditions, may become so densely concentrated that they generate anoxic conditions that can cause fish kills. Certain species such as dinoflagellates and cyanobacteria can also produce potent toxins. Algal blooms generally consist of a single species making identification important to aid in its control. Differences in water color (yellow, brown, green, blue or milky) may be a good indicator of an algal bloom and help in the identification of the organisms involved (Department of Health and Environmental Control).

e) Water temperature

Exposure to extreme water temperatures is a potential cause of fish kills. This may happen towards the end of the dry season, when the water temperature may exceed the tolerance range of the fish, resulting in fish deaths. Water temperature may affect fish in two ways. The metabolic activity of fish (oxygen consumption) is related to temperature; an increase in temperature will increase metabolic activity. Water temperature also affects the amount of soluble oxygen in the water, with increasing temperatures comes decreasing oxygen levels. Consequently in very warm areas, metabolic activity increases and thus oxygen consumption is high whilst the potential concentration of dissolved oxygen is low. However, as with other water quality variables, tolerance levels do vary between species of fish and most species are generally tolerant to temperature extremes when gradually acclimatized

f) Parasites and diseases

Fish are subject to a variety of bacterial, viral and parasitic diseases. Under stressful conditions, physical and environmental (i.e. extremes in water temperature, pH etc), the resistance of fish to

disease is lowered and infections can occur. Usually histopathological examination of fresh tissue is required to determine the presence of diseases.

g) False fish kills

False fish kills refer to the situation where unwanted "rubbish" fish have been discarded. The fish are usually small, undesirable species with hook related injuries or some other man made interjection.

h) Pollution

Pollutants can come from a variety of sources including industrial waste, sewage and agricultural chemicals (pesticides and insecticides). Pollution can kill fish either by direct poisoning or indirectly, by a catastrophic change in water quality. It is often difficult to identify the cause of a chemical fish kill. The quick dilution in run-off and rapid (less than 48 hrs) degradation of the many common pesticides and insecticides often removes any evidence of a chemical spill. Poisoned fish (affected by pollutants) often show signs of internal hemorrhaging and erratic swimming behavior.

Notification of a Fish Kill

It is important that all fish kills are reported as soon as possible. Usually the cause of a fish kill can only be determined when investigating officers are on site during or just after the actual fish kill event. A rapid response is necessary to identify the cause or before the causing agent may become diluted or dispersed.

4.4.7 Wildlife Management Practices

4.4.7.1 Ecosystem Restoration and Habitat Improvement

Fort Jackson employs multiple techniques to enhance and restore the native longleaf pine habitat. Commercial tree harvesting, prescribed fire, herbicide applications, and mechanical vegetation control all contribute to the restoration efforts. These actions are described in more detail in appendix 2. In addition to the longleaf pine forest types, Fort Jackson contains other cover/habitat types that are protected or managed for the benefits of game and non-game wildlife. This diversity also contributes to the overall sustainability of the installation for long-term utilization for military training.

In order to maintain and enhance the wildlife on Fort Jackson, a variety of habitat types will be maintained. A greater variety of habitat types will allow for a greater diversity of wildlife species living on Fort Jackson. Most efforts are directed toward activities, such as prescribed fire and commercial timber harvesting, that will benefit multiple species, both game and nongame. A few species-specific activities will be utilized for the most popular game species on Fort Jackson.

4.4.7.2 Prescribed Fire

Prescribed fire is one of the most cost-effective methods to set back plant succession over large acreages. The RCW is the primary featured species with regard to growing season burns, as described in Appendix 2. Prescribed fire can also be of great benefit to other wildlife species, such as the Wild Turkey and various small game species. Fire can also benefit White-tailed deer by increasing the availability and nutrition level of understory plants; reducing large, woody understory stems; encouraging production of new sprouts; reducing roughs that suppress forbs and grasses; keeping browse within reach of deer; and encouraging understory fruit and mast production.

Prescribed fire is also used for the prevention of potentially catastrophic wildfires. Most areas will be burned on a 1 to 5 year rotation. Certain impact areas and ranges may be burned on an annual frequency. Fire maintains an open understory that will provide native grasses and legumes, recycle nutrients, and provide bare mineral soil for seed germination. These results will provide a valuable food source in seeds and bugging grounds for many animal species.

Prescribed fire will be one of the main techniques used in managing wildlife habitats. Burning has a positive impact on large areas with minimal cost therefore burning is one of the most beneficial management tools. All prescribed fires will be conducted in accordance with the Fort Jackson Integrated Wildland Fire Management Plan (Appendix 5).

4.4.7.3 Native Warm-Season Grasses and Ground Cover

Efforts to enhance and restore herbaceous native ground cover communities are necessary to improve the overall health of the ecosystem. Land and forest management practices prescribed in this plan all take into consideration the effects of the practice on the native herbaceous ground cover.

Practices used to enhance native ground cover include:

1. Plantings of coastal plain native ground cover mixes that contain Southeastern Coastal Plain or Sandhills ecotypes.

2. Eradication of non-native vegetation utilizing an integrated pest management approach, which may include the use of herbicides.

4.4.7.4 Dove Fields

Mourning Doves are a popular game species among Fort Jackson hunters. Doves prefer large, open fields with low ground cover or bare dirt. These environments increase the ability of the birds to forage on seeds and decrease the risk of predation. Supplemental planting of grain crops can also greatly increase the chances that an area will attract and hold doves. The most commonly used dove field crops on Fort Jackson are various millet varieties and sorghum. Others that are sometimes used include corn, sunflowers, and Egyptian Wheat. Cool season crops, such as wheat and oats, are also planted in portions of some dove fields and left standing through the following

year in order to provide another food source for doves. State and Federal law allows for some manipulation of fields in order to attract doves, so tilling, mowing, and burning are often implemented to expose seed after crop maturation. Herbicides are also applied to these fields in order to control invasive weeds.

4.4.7.5 Hardwood Mast Management

Mast-producing hardwood tree species that benefit a variety of game and non-game wildlife will be maintained as a component of the ecosystem. Some examples of how these are maintained include the preservation of quality upland hardwoods during timber harvesting and mid-story control operations. Although prescribed fire may be used to control hardwood encroachment in upland pine stands, not all the hardwood tree species are affected. Larger diameter hardwoods and certain hardwood species are typically not adversely impacted by fire. Hardwoods found in more mesic areas are often naturally protected from fire resulting in examples of oak-hickory forest types typical of the Piedmont. Mast producing hardwoods are maintained in bottomland hardwood areas and stream-side management zones throughout the installation.

4.4.7.6 Wildlife Openings

Wildlife openings on Fort Jackson can consist of areas that are planted annually or on a rotational basis, and openings which remain fallow and are dominated by native grasses and early succession plant species. Due to staffing and budget restrictions, and to limited availability of forest openings, the actual acreage planted and maintained on Fort Jackson is well below the optimum amount prescribed by many wildlife managers. The Fort Jackson Wildlife Branch will continue to maintain wildlife plantings and openings as resources allow.

4.4.7.7 Management of Game Species

Due to the popularity of hunting for certain game species, specific management actions will be conducted to enhance and maintain the populations of those animals.

<u>White-tailed Deer</u>

The white-tailed deer is the most sought after game species in South Carolina and on Fort Jackson. The primary objective of deer management on Fort Jackson is to manage deer numbers to optimize recreational opportunity and to minimize habitat damage, traffic accidents, disease outbreaks, and other negative impacts associated with a high density deer population. The secondary objective of deer management is to regulate the composition of the harvest to optimize herd health and maximize recreational satisfaction (i.e. improve body weight, and antler characteristics considered desirable by hunters). The maximum sustainable yield for the deer population on Fort Jackson is determined through monitoring of herd health characteristics and relative abundance gleaned from harvest data and surveys. Declining harvest data are assessed to determine if over-harvest is responsible. If so, the harvest is adjusted to create a buffer against losses from other mortality factors such as coyote predation. The harvest should then stabilize at the level of maximum sustained yield.

Historically, Fort Jackson's white-tailed deer herd was typical of populations with a history of heavy buck harvest and little or no doe harvest. The sex ratio was skewed towards does; the doe population was skewed towards the older age classes; and the buck population was skewed towards the younger ages. During the mid-1980's, individual deer health characteristics were fair to poor, and habitat damage from over-browsing was occurring. Indications were that there was an overabundance of deer in relation to carrying capacity. To reverse the downward trends in condition indices, and attempt to realign the deer population with the habitat carrying capacity, a goal was established to reduce the deer population. To reverse this trend, the harvest was increased beginning in 1988 by increasing the doe harvest and maintaining or reducing the buck harvest. This was accomplished by increasing the number of antlerless deer tags issued, and maintaining traditional bag limits for bucks. The doe harvest continued to be increased in this manner until it exceeded the buck harvest.

The current deer population on Fort Jackson is considered to have an acceptable sex ratio and to be within the carrying capacity of the available habitat. Future management of Fort Jackson's deer herd will have to be adjusted to account for factors such as changes in habitat and hunter participation. In addition, the installation is now home to what appears to be a thriving coyote population. This predator is a new variable in the deer management equation, and its effects on the deer population will need to be monitored closely. The following management practices are now being implemented on Fort Jackson:

1. Harvest Strategy. Fort Jackson's deer season is from 15 August through 1 January for bucks and 15 September through 1 January for antlerless deer. The annual bag limit is three bucks, and two antlerless deer. All deer harvested on Fort Jackson are required to be checked in at the Big Game Check Station. Fort Jackson's deer seasons and bag limits are never less restrictive than state deer seasons and bag limits for Richland County.

2. Cantonment Area Population Reduction. The deer population in and around the cantonment area can be influenced by the urbanization of adjacent private lands forcing deer onto Fort Jackson where there is still available habitat. Due to the large number of deer related vehicle accidents that have occurred in the past, the cantonment deer numbers need to be kept at a reduced level. To decrease the population, archery hunting with harvest of either sex animals is allowed in this urban area beginning September 15 and lasting through the remainder of deer season.

3. Quality Deer Management. During the 2010 deer season, a survey of hunters was conducted to assess the desire for a Quality Deer Management Area on Fort Jackson. Of the responses, nearly 84% favored the establishment of such an area. During a 2011 revision, rules were added to the Fort Jackson Hunting and Fishing Regulations (FJ 28-4) that created a Quality Deer Management Area (QDMA) on Fort Jackson. Data had long indicated that a majority of the largest bucks harvested on the installation were within close proximity to the East Impact Area or the Colonel's Creek drainage. Hunter access to the East Impact Area is prohibited. The Colonel's Creek drainage includes large areas of densely vegetated, swampy terrain which greatly hinders accessibility. Prime habitat, combined with very low human pressure, provides an ideal situation for the maturation of deer in these areas. For this reason, the QDMA was designed to surround these areas. No

change was made to the bag limit for this area, but any buck harvested must possess a 12 inch minimum inside antler spread, or 4 antler points on one side of its rack. Harvest data from this area will be closely monitored in the years to come, and harvest strategy will be altered if needed. A heavier emphasis may also be placed on supplemental planting and mast-producing tree management within the QDMA, if funds and resources become available. Prescribed burning and mid-story control are also conducted in this area.

4. Hunter Education. The Fort Jackson Wildlife Branch will continue to provide information on pertinent subject matter in an attempt to improve the hunter's understanding of overall management goals and objectives. Subject matter may include various topics such as coyote harvest, timing of doe harvest, or developments in wildlife research.

Wild Turkey

Good wild turkey habitat exist throughout much of Fort Jackson, featuring mature hardwoods along the creek drainages for mast production; mature pine stands; open understories to take full advantage of the turkey's keen sight; scattered clearings for feeding; nesting and strutting areas, well distributed water supplies; sufficient prescribed fire to stimulate plant production, improve palatability, and nutrition; and reasonable freedom from disturbance. In addition, many of the installation's wildlife openings are managed for the benefit of its abundant turkey population.

Bobwhite Quail

Although some good quality quail habitat exists on Fort Jackson, quail numbers remain significantly lower than they were historically, as is the case throughout most of the southeast. Fort Jackson will continue to follow RCW management guidelines for burning and timber harvest. These actions should prove to be very beneficial for quail. Frequent burning favors the growth of annuals and results in a more open condition, which quail prefer. Timber management follows the RCW guidelines and will promote open woodlands beneficial not only to bobwhite quail but also to wild turkey and RCW. Restoration of native ground cover and warm season grasses will benefit quail. Maintenance of wildlife clearings planted with sorghum, millet, partridge pea, wheat, sunflowers, or native warm season grasses in areas throughout the installation will provide an additional food source for quail. The dove field areas, which primarily feature large stands of sorghum and millet varieties, are often the most beneficial. This habitat management should significantly benefit bobwhite quail.

Doves

Mourning dove is a highly mobile species, and local habitat conditions do not limit the total population; however, providing good habitat year round can increase local populations. Dove management on Fort Jackson focuses primarily on concentrating their numbers during hunting season and adjusting annual hunting regulations. Dove fields will be established by planting both warm and cool season grain crops, and by using agricultural equipment (i.e., mowing and tilling), prescribed fire as well as herbicide applications to further enhance the attractiveness of the areas.

Waterfowl

Nearly all bottomland hardwood stands on Fort Jackson contain some oak species for mast production, which is an important food for some duck species, especially wood ducks. Additionally, many of the controlled lakes and beaver ponds serve as roosting and nesting areas. There are also open water areas throughout the installation which are preferred habitats for some waterfowl species. Wood ducks and resident Canada Geese are present on Fort Jackson all year, but various other species, such as Ring-necked ducks and Green-winged teal, often visit the installation during winter migration. Fort Jackson Wildlife Branch personnel utilize moist-soil management practices on some ponds in order to improve waterfowl habitat. Ponds are drawn down in the summer to allow for vegetation to grow around the edges. In the fall the lakes are flooded to allow access to this food source by ducks. Also, seed producing plants may be planted on the edges of these ponds during drawdown to provide supplemental food in the fall of the year, if weather conditions and resources allow. Two impoundments, which are associated with Davis Pond, are planted and flooded annually. These areas are normally planted with millet or sorghum varieties and provide another supplemental food source for waterfowl. Wood duck nest boxes are a useful management tool that is used on Fort Jackson. There are currently more than 100 nest boxes maintained on the installation. A high percentage of these boxes are used by wood ducks each year, and nest success is also high.

Rabbits

Cottontail Rabbits thrive in openings where shrubs, grasses, and forbs dominate and in woodlands with fairly open canopies (40 to 50 percent crown closure). This level of canopy closure allows sufficient sunlight to reach the forest floor to produce desirable grasses and forbs. A high degree of pine crown closure serves as a limiting factor to rabbit populations at many areas on Fort Jackson. Prescribed fire, which improves nutrition and palatability of food plants, is of little benefit where crown closure prevents the growth of food. Habitat management techniques, such as mowing, harrowing, planting, thinning of pine plantations, and prescribed burning benefit cottontail rabbits. Various wildlife openings, ranges, clearings, and artillery firing points that are dominated by shrubs, grasses and forbs provide good habitat. Pine woodlands of fully stocked pole and sawtimber stands shade the forest floor, inhibiting the growth of adequate succulent forage. Consequently, areas most suitable for rabbits shift throughout the installation as pine stands are altered. Swamp Rabbits are also present on Fort Jackson. Swamp Rabbits generally prefer thickets, marshes, and edges associated with wetland areas. Adequate habitat of this type exists on the installation, but much of it is largely inaccessible. For that reason, the regularity with which swamp rabbits occur on Fort Jackson is unknown, and any management attempts would be severely limited.

Eastern Gray Squirrel

Productive gray squirrel habitat contains a wide variety of mast-bearing hardwood trees; fruit producing trees and shrubs; flowers, buds, and cones in addition to adequate den cavities for escape, shelter, and raising young. Suitable gray squirrel habitat exists throughout the installation and is most commonly associated with creek drainages and low-lying areas where a high percentage of Fort Jackson's mature hardwoods are found.

Fox Squirrel

In contrast to the gray squirrel, fox squirrels prefer open park-like woods with sparse vegetation. Since the fox squirrel is adapted to ground movement, it uses widely scattered hardwoods in pine uplands. Management strategy for fox squirrels favors stands of mature pine preferably longleaf, with scattered pockets of hardwoods, which are essential for dens and food diversity throughout the year. Scattered oaks throughout upland pines should also be protected. Snags are left for den sites, except in the cantonment area. Prescribed fire can be utilized every 3 to 5 years to maintain ground foraging habitat.

4.4.7.8 Monitoring

Key information needed to successfully manage a population of wildlife is to estimate/know population size, sex ratio, mortality, natality, and age distribution. To help accomplish this task the following population census and/or sampling methods will be used.

1. **White-tailed deer** - Deer surveys will be conducted on an as-needed basis and as time and resources allow. Surveys may be conducted using traditional spotlight survey techniques or with the use of FLIR (forward looking infrared) equipment in cooperation with USDA-Wildlife Services, and applicable scientific protocol will be followed in order to provide the most useful data. This information, along with check station sampling of harvested deer and record on the number harvested, will aid in making decisions concerning deer herd management. Check station sampling will also collect weights, jawbones to determine age, and antlers measurements of bucks to monitor health of the deer herd.

2. **Wild Turkey** - In the spring of each year, turkey hunt data is collected. The weight, beard length, and spur length of each harvested bird, along with other variables, such as hunter effort, are all monitored. Fort Jackson also participates in a turkey brood survey each summer in cooperation with the SCDNR.

3. **Bobwhite Quail** – Every summer, Fort Jackson participates in a Bobwhite Quail Whistling Cock survey and a Quail sighting/brood survey, both in cooperation with the SCDNR.

4. **Fox Squirrel** – Fort Jackson participates in a Fox Squirrel sighting survey conducted by the SCDNR. The survey collects data on color phases of the squirrel as well as habitat usage, and occurs on a two year rotation.

5. **Bald Eagle** - In 2010 the first nesting pair of Bald Eagles was documented on Fort Jackson. These birds are no longer on the Endangered Species list, but are protected by the Bald and Golden Eagle Protection Act and state laws. The nest is monitored yearly.

6. **MAPS** - *"The Monitoring Avian Productivity and Survivorship (MAPS) program comprises a continent-wide network of hundreds of constant-effort mist netting stations. Analyses of the resulting banding data provide critical information relating to the ecology, conservation, and management of North American landbird populations, and the factors*

responsible for changes in their populations." Fort Jackson participates in the MAPS program by using mist nets to capture, collect data, and band birds.

7. **Annual Nightjar Surveys** - Nightjars refer to a group of birds that belong to the Caprimulgidae family. Nightjars found on Fort Jackson include Whip-poor-wills, Chuck-will's-widows, and Common nighthawks. The primary objective of the survey is to contribute data to the Nightjar Survey Network, Center for Conservation Biology, at the College of William and Mary, Williamsburg, Virginia. This data helps determine the population distribution and trends of nightjar species across the United States.

8. **Furbearer Surveys –** In 1984, a statewide scent station survey was initiated in South Carolina. Fort Jackson began participating in this survey around 1987. The purpose of this annual surveys is to provide an index to the relative abundance of terrestrial furbearing animals. The data collected from these surveys is used to facilitate the decisions on furbearer resources on Fort Jackson and statewide.

4.4.7.9 Nest Boxes

Nest boxes provided for several species on the installation will be maintained, monitored, and for some species, increased.

1. American Kestrel - The American kestrel, North America's smallest falcon, is listed by South Carolina's Department of Natural Resources as a "Highest Priority Species of Concern" in South Carolina. Fort Jackson is actively involved in maintaining and monitoring American kestrel nest boxes to encourage the reproduction of the species. Sixty kestrel nesting boxes are maintained across the installation. Monitoring efforts from breeding seasons (2009-2011) show American kestrels using greater than 70% of the boxes for nesting. Eastern screech owls, Southern flying squirrels, and Eastern bluebirds are other frequent users of the nest boxes.

2. Eastern Bluebird – Fort Jackson maintains 20 Eastern bluebird boxes around the cantonment area for the enjoyment of bird watchers. Bluebird populations were declining in the 20th century due to the aggressive competition for nesting cavities from introduced species like the European Starling and the House Sparrow. The establishment of bluebird nest boxes has helped to increase the population in many regions.

3. Purple Martins - In February 2011, biologists in the Wildlife Branch erected a purple martin nesting structure on Fort Jackson at Semmes Lake. This was the first time a nesting structure had been placed on the installation for this avian species. Within a month the first Purple martin arrived, and by the end of July there were 3 nests that fledged 5 birds each. The most martins counted at the nesting structure were 24 birds. This was an outstanding success as many new martin nest structures do not attract birds for several years. These martins return each year to Fort Jackson, enhancing the enjoyment of Soldiers and families that visit Semmes Lake recreation area.

4. Wood Duck – Over 100 Wood Duck nesting boxes are currently monitored and maintained by Wildlife Branch personnel on Fort Jackson. Each winter, boxes are repaired as needed, cleaned out, and filled with new bedding material. Data is also collected on the previous nesting season usage. These boxes provide valuable nesting habitat to Wood Ducks and are also commonly used by non-game species such as the Screech Owl. This nesting box program has routinely been successful, yielding high usage rates and hatches each year.

4.4.7.10 Harvest of Game Species

To help maintain stable populations of game species, hunting seasons will be opened annually. These seasons and bag limits will coincide with those set by the SCDNR, but may be more restrictive. All game harvested will be accounted for on harvest records located at the Heise's Pond Big Game Check Station. It is mandatory that hunters provide all required harvest information.

4.4.7.11 Control of Nuisance Wildlife and Wildlife Damage

The Fort Jackson Wildlife Branch will coordinate with the United States Department of Agriculture's Wildlife Services (Wildlife Services) and other agencies for guidance and assistance with the control of nuisance wildlife. Several species of wildlife occur in numbers and locations considered to be unacceptable to people. These nuisance animals will be managed using an integrated wildlife damage management (IWDM) approach when their Wildlife Acceptance Capacity is reached or exceeded.

Wildlife Acceptance Capacity (WAC), sometimes known as cultural carrying capacity, is the maximum wildlife population level in an area that is acceptable to people (Decker and Purdy 1988). For wildlife damage situations, there will be varying thresholds for those people and resources directly and indirectly affected by the damage. This threshold of damage is a primary limiting factor in determining the WAC. Once this WAC is met or exceeded, population reduction methods are implemented to alleviate associated damage and conflicts.

Beavers

Beavers are the most problematic nuisance species on Fort Jackson and are present in almost all of the water bodies on the installation. Beavers regularly build dams at bridges and water control structures, causing roadway flooding and damage to the structures. Many trees have also been damaged on Fort Jackson, either by flooding or girdling. Beaver caused flooding also threatens endangered species habitat and military ranges and training areas on Fort Jackson.

Beavers are typically controlled by shooting and trapping with foothold traps, snares, and Conibear traps. Alternatives such as pipes under beaver dams (Clemson Beaver Pond Leveler) may be used, but will not negate the need to trap some animals. Beaver dams are breached using binary explosives, mechanical excavators (backhoes) and by hand.

Feral Hogs

Occurrences of feral hogs on Fort Jackson have increased. To date, only small groups of hogs have been confirmed. However, large, established populations of feral hogs do occur within close proximity to the installation boundaries. For this reason, it is believed that increased hog activity on Fort Jackson is imminent. Feral hogs can cause a wide array of problems. Significant habitat degradation due to rooting is generally the most severe and widespread damage threat. This damage can directly or indirectly have an adverse impact to endangered species, especially plants. Hogs may also out-compete native wildlife for food sources. Other risk factors include predation (especially on ground nesting birds, reptiles, and amphibians), and erosion issues. Feral hogs in South Carolina are known to carry many diseases, most notably Swine Brucellosis. Thus far, damage to wildlife openings has been the most significant hog damage documented on Fort Jackson.

Trapping and shooting are the most common control methods utilized in an attempt to slow the establishment of hogs on Fort Jackson. Feral hog control activities are generally done in cooperation with Wildlife Services. Wildlife Branch personnel will also continue hunter education efforts in order to encourage the legal harvest of hogs.

Resident Canada Geese

Resident Canada geese (Branta canadensis) congregate in large numbers on the Fort Jackson golf courses, around cantonment area lakes and ponds, and areas used by Soldiers for physical fitness activities, often leaving behind unacceptable quantities of feces. Human health may be impacted by these feces, especially from the threat of parasites and bacteria such as Cryptosporidium parvum, Giardia lambia, salmonella sp., and E. coli.

Management techniques for Canada Geese include hazing and egg oiling programs to reduce population growth, a no feeding policy, and removal of domestic ducks and geese, as part of an IWDM approach in managing Canada geese. In addition, during the summer molt the geese are live captured and delivered to a local a USDA inspected processing facility.

Vultures

Black and Turkey Vultures regularly roost and occupy wooded areas within the housing area of Fort Jackson. These large groups of vultures often damage roofs of homes, and create health and safety concerns. Their droppings pose health concerns near homes and playground equipment, and their low-altitude soaring behavior can cause a hazard to vehicle operators on roads.

Management techniques include the use of sound and light devices and vulture effigies hung correctly in roost trees at the roost locations to disperse the vultures. In some instances, lethal removal of birds may be required to effectively resolve the damage.

4.4.8 Personnel Responsibilities

The U.S. Army Garrison, Fort Jackson is directly responsible for the implementation and enforcement of the Fish and Wildlife Management Plan. The responsibility of installation stakeholders was discussed in detail in Section 1.4.

4.4.9 Outside Assistance

The planning and management of natural resources on Fort Jackson is a collaborative effort that requires assistance from Federal and state agencies, educational institutions, contractors, and other interested parties. The responsibility of external stakeholders (i.e., USFWS and SCDNR) was discussed in detail in Section 1.4.2 and beneficial partnerships are discussed in detail in Section 3.4

4.5 FOREST MANAGEMENT

The RCW ESMC (appendix 2) provides detailed plans and objectives for forest management within the RCW Habitat Management Area. Forest management practices including prescribed burning, wildfire suppression, chemical and mechanical treatments, along with some reforestation activities will improve and enhance installation lands. These practices are compatible with the current and foreseeable training missions on Fort Jackson.

4.5.1 Goals

To manage the installation's forests to provide quality missionscape for the training mission, while also enhancing wildlife habitat especially for endangered species, and ensuring a healthy forest ecosystem.

4.5.2 Objective

The Forest Management Section will be used by forest resource managers and other natural resource professionals as a planning tool and guidance for providing a healthy forest ecosystem. The forest management program is implemented by the Forestry Branch, Environmental Division of the Directorate of Public Works. When determining which natural resource projects will be implemented the following items are considered: income from the sale of forest products, manpower, and the funding level of the conservation program. This plan is intended to provide the flexibility to accommodate these conditions, while insuring support of the military mission.

The activities described herein provide a framework for the orderly and scientific management of the installation's forests. The primary objective is to provide a healthy forest ecosystem that supports and enhances military training, and the enhancement and protection of other natural resources associated with forest resources.

4.5.3 General Information Inherent to the Forest Management

4.5.3.1 Forest Products Market

The Columbia area has historically had a strong local demand for wood fiber, chip-n-saw, and sawtimber. The future market forecast for pine pulpwood, hardwood pulpwood, pine chip-n-saw, and pine saw logs is expected to remain at current levels. Pine pulpwood operations in the area have changed over the last 15 to 20 years from short wood to tree length operations. Such utilization changes have influenced the market in this area. Short wood has been replaced by tree length wood that is used for chipping, as well as for dimensional wood. In addition, low grade hardwoods, which were previously non-merchantable, are increasing in demand for pulpwood operations. The loss of harvesting by short wood methods has reduced the capacity to harvest small volumes of timber (less than 250 Tons), particularly small salvage sales and also timber harvesting associated with new construction.

The USACE, Savannah District maintains a mailing list of potential bidders for each sale, which includes timber mills, their dealers, independent timber harvesting contractors, as well as pinestraw harvesting contractors.

4.5.3.2 Harvest Cycles

Timber

Current and future timber harvests will be based on several factors, which include but are not limited to stocking levels (Basal Area), growth rates, military training requirements, construction, threatened and endangered species habitat requirements, and metal contamination. GIS and the RCW matrix will be used first to determine what stands need to be thinned to improve RCW habitat. Based on those results and input from the RCW Biologist, an annual timber harvest plan will be developed. Those stands scheduled to be harvested the next fiscal year (FY), will be inspected in the field and the GIS data verified. Once verified, a prescription will be developed for each stand.

4.5.4 Description of Forest Types and Forestland Classifications

4.5.4.1 Forest Types and Tree Species

Most of the tree species common to the Fort Jackson can be grouped into seven major forest types based on the existing forest conditions and management requirements. They are Natural Pine, Pine-Hardwood, Pine-Scrub Oak, Hardwood-Pine, Scrub Oak, Upland Hardwood, and Bottomland Hardwood.

Natural Pine

Longleaf pine and loblolly pine make up this type. Currently, planning is underway to restore shortleaf pine in some areas of the installation known to contain shortleaf pine. This forest type includes all natural pine stands, regardless of species, in which at least 80 percent of the overstory

BA is pine. A further breakdown into sub-types can be made according to pine species and mixtures, which normally vary, with the topography and soil on the installation. Longleaf pine historically was the predominant species that grew naturally on the dry, deep, sandy soils of the Sandhills region. It occurs in pure stands on the sand ridges and upper slopes becoming mixed with loblolly pine on the lower slopes and wetland margins. Loblolly pine grows naturally on the clay type soils of the piedmont region and on wet soils associated with wetlands. It occurs in pure stands on the installation on the upper and lower slopes where clayey soils exist, and on wetland soils associated with drainages becoming mixed with longleaf on the dryer slopes and ridges in the absence of fire. Loblolly pine exists in pure stands on sites that historically would have been longleaf sites because of past human activities both before and after U.S. Army ownership.

Pine-Hardwood

For this type, the pines must constitute 50 to 79 percent of the overstory BA, the remainder of the overstory being hardwood, where scrub oak is not the dominant species. This type can be divided into two sub-types according to site. Longleaf, loblolly, and/or shortleaf pine are commonly found mixed with upland hardwoods on the upper and lower slopes and loblolly and/or pond pine with bottomland hardwoods on the lower slopes and bottomland sites.

Pine-Scrub Oak

This type is made up of pine with a scrub oak understory that may revert to scrub oak without proper management. Longleaf pine is typically the pine species associated with this type but other pine species may also be present. The area must have greater than 30 percent pine BA, but less than 80 percent pine BA, and scrub oak is the dominant hardwood type. This type is usually located on sand ridges and upper slopes where sandy soil is relatively deep.

Hardwood-Pine

The pines in this type must constitute greater than 20 percent of the BA but less than 49 percent of the BA.

Scrub Oak
A minimum of 51 percent of the hardwood BA must be dominated by scrub oak to be classed as this type; the remaining BA is usually composed of scattered longleaf pine of less than 30 BA. Scrub oak species include turkey oak, blackjack oak, sand post oak, and bluejack oak.

Upland Hardwood

Less than 20 percent of the BA of the overstory trees in this type can be in pine, and the hardwood species are dominated by upland hardwood species. Upland hardwood species are any of the following; southern red oak, water oak, northern red oak, scarlet oak, white oak, post oak, beech, pignut hickory, and mockernut hickory. Persimmon, dogwood, and black cherry are also found in association with upland hardwoods. Upland hardwoods are usually located on lower slopes, or on soils containing more clay than sand.

Bottomland Hardwood

Less than 20 percent of the BA of the overstory trees in this type can be in pine, and the hardwood species are dominated by bottomland hardwood species. Bottomland hardwood species are any of the following; black gum, red maple, sweetgum, yellow-poplar and bald cypress. These species are located in head waters of streams, swamps and poorly drained soils bordering streams.

Other Sub Forest Types

Plantations are divided into forest types based on species. PPZ is the code for longleaf pine plantations. PPS is the code for slash pine plantations. PPL is the code for loblolly pine plantations. PPH is the code for shortleaf pine plantations. Although plantations are not specifically a forest type, at Fort Jackson they are listed as a forest type, because they are substantially different from natural pine stands in their composition.

4.5.4.2 Forestland Classification

U.S. Army regulations currently specify two forestland classifications: reimbursable (commercial) and non-reimbursable (noncommercial) forestland. Reimbursable forestland (RFL) is described as land that is capable of economically producing crops of industrial wood in excess of 20 cubic feet per acre per year under management, and is not programmed for another use that would preclude future forest development. The direct bullet impact area of all small arms ranges, the East Impact Area, and the other known UXO areas are withdrawn from the RFL category in the current inventory.

Current Federal law and DoD/U.S. Army policy prohibits the use of reimbursable forestry funds for activities that cannot reasonably be expected to produce forest revenues or in areas that are classed as Non-Reimbursable forestland (NRFL). An increase in NRFL acres will increase the need for other funds to cover forest ecosystem management and protection activities, which historically have been paid for with reimbursable forestry funds. The availability of current NRFL for forest management is not foreseeable at this time.

4.5.5 Management

4.5.5.1 General

Fort Jackson Forest Management Program activities, such as thinning pine stands, restoration, and related projects, are directed primarily toward enhancing the military training environment and restoring the longleaf pine ecosystem. Management for pine stands is directly related to management of endangered species, principally the Red cockaded Woodpecker (RCW). Forestry prescriptions are written in accordance with the silvicultural guidelines of the revised 2003 RCW Recovery Plan, the 2007 Management Guidelines for managing RCW on Army installations, the 2013 Fort Jackson RCW ESMC, and 4-3 of AR 200-1. Restoration of the longleaf pine ecosystem on Fort Jackson has been a major initiative for the forestry program. Fort Jackson has converted over 6,600 acres of off-site pine to longleaf pine since 1993.

4.5.5.2 Forest Inventory

A primary responsibility of the Forestry branch is to maintain a forest inventory of the installation. Analysis of forest inventory data provides a more accurate, up to date estimate of the forest volume, type, and health. Fort Jackson completed an installation-wide forest inventory in 2010/2011. The overall total tree volume is expected to increase, with a greater increase of pulpwood volume due to pine plantations on Fort Jackson reaching merchantable size.

A forest inventory is generally not as intense as a cruise for a timber sale. Factors that may affect the intensity of a forest inventory include the availability of time, funds, personnel, number of acres to inventory, location of the stand, and purpose of the inventory. Data collected for an inventory is similar to a cruise, but additional information is taken on the site quality, age, and the data needed for input into the RCW matrix. Stratified systematic point sampling is the method used for inventorying timber stands. Number of plots per stand is determined by the forest type, stand variability, and acreage in the stand.

Timber cruising is an intensive inventory of a forest stand to determine the quantity of forest products that can be derived from a timber sale, and data used to assess the quality of RCW habitat. Data collected includes tree species, tree quality (i.e. sawtimber, pulpwood, pole, etc.), tree size, and tree quantity to determine stand and stock tables. The systematic sampling method is used not only for a forest inventory, but also as the preferred method for a timber sale. The sampling pattern is a definite grid, whereby the lines of sampling points are the same distance apart. The Fort Jackson "Standard Operating Procedures, for Silvicultural Management Control" (Appendix 6) contain further information on forest inventory and timber cruising.

4.5.5.3 Primary Forest Tree Species for Management

Longleaf and loblolly pines, native to the installation, will be the primary forest tree species emphasized in management since the majority of the forestland soils support one or both of these species. Other native forest communities, such as bottomland and upland hardwood stands, will be grown and managed in areas to which they are adapted. During the 1950s, 1960s, and early 1970's, the majority of pines planted were slash pine because of this species' excellent seedling survival and the longleaf seedlings very poor survival rate. Fort Jackson is located outside of the natural range of slash pine, in addition to poor growth in the dry sandy soils that occur on the installation, individuals planted here are susceptible to severe ice damage and a high incidence of fusiform canker. Plans are to replace the slash pine with longleaf pine. In addition, shortleaf pine will be restored to areas which originally contained this species. Soil types and site conditions will determine which of the three preferred species will be used.

4.5.5.4 Rotation Ages

The rotation ages set forth below are minimums and do not establish an absolute rotation age. A rotation will not be established for longleaf pine, bottomland hardwoods, or upland hardwoods. The rotation age for other pines is 100 years. On some sites loblolly pine may not survive to that age. If a loblolly pinestand is obviously deteriorating, its disposition will follow the Fort Jackson

RCW ESMC. Pines in active RCW clusters and recruitment clusters will have no rotation age in accordance with the 2007 Guidelines for Managing RCW on Army installations.

4.5.5.5 Compartments and Stands

The entire installation, including the cantonment area, protected forest areas, and impact areas, were originally divided into ten compartments with each compartment boundary coinciding with roads, streams, or other permanent features. Management compartment boundaries were redefined in 1980 to include 13 compartments. This was done to develop more practical boundaries, isolate the impact and cantonment areas into separate compartments, and organize compartments into more logical boundaries.

The stand is the lowest forest management unit. Stands are subject to change in size, classification, and composition, due to changing military land use, fire, insect, storm depredation, and/or forest management actions. The concept of stands within compartments provides managers with the resources and records control that are positively identifiable, but flexible enough to permit changes over time.

Stands will be identified within each compartment, and will be designated "Stand 1" through "Stand n," beginning with Stand 1 in each unit. All management references will be by Compartment and Stand Number, for location purposes (for example: Compartment 12, Stand 3 or 12003).

4.5.5.6 Forest Management Information Systems

Currently all forest inventory data and past silvicultural stand treatments are stored in an enterprise geodatabase.

The following is a list of permanent records and methods of recording.

Report Forms (Proponent and Location)

- Timber availability reports for current and previous FY with projection for the next FY. (File Folder in FJ Forester's Office)
- Timber sale contracts in progress. (FJ Forester)
- Income summary by FY. (U.S. Army Corps of Engineers, Savannah District, & Forestry File Cabinet)
- Cost summary by FY. (Forestry File Cabinet Historical before 2009, GFEBS since 2009)

Files (All files are located on GIS Server)

- Current and proposed FY timber harvesting areas.
- Current and proposed FY reforestation areas.
- Current prescribed burning areas.
- Completed prescribed burning areas by FY.
- Number and location of wildfires by FY.

- UXO containing areas and metal contaminated timber areas.
- Plantation records by FY.

4.5.6 Silvicultural Practices

4.5.6.1 Pine Management

The even-aged management system is used for pine on upland sites and bottomland hardwoods on bottomland sites. The primary objectives of current silvicultural practices are to enhance military training areas, while managing for a healthy forest ecosystem.

Pine stands greater than 80 basal area are thinned to a basal area between 40-80 square feet during each prescription cycle through rotation age. During the next 5 year cycle, no stands are designated for final harvest.

4.5.6.2 Bottomland Hardwood Management

Forest management of Fort Jackson's roughly 5,500 acres of bottomland hardwoods is performed based on the condition of each stand. Harvests that take place on Fort Jackson comply with practices outlined in the Best Management Practices for South Carolina's Forest Wetlands and requirements of Section 404 of the Clean Water Act.

The primary goal of silvicultural management of bottomland hardwoods on the installation is to improve the health and vigor of the stands and restore historically occurring hardwood tree species and associated vegetation. Silvicultural methods employed include shelterwood, croptree, seedtree, single tree, group selection, patch or clearcut, and in sensitive areas, such as streamside management zones, the single tree selection method. These silvicultural methods are outlined in the South Carolina's Best Management Practices for Forestry. These silvicultural methods will be used to improve and restore areas, which have been high-graded in the past. No bottomland hardwood management is scheduled during this 5 year cycle.

4.5.6.3 Metal Contamination

Trees contaminated with bullets and shrapnel have likely occurred since soldiers began firing munitions at Fort Jackson. The location, level, and type of metal contamination have not been precisely defined on the installation. Those stands that have low levels of contamination are managed using forestry funds, as long as there are mills that can use contaminated timber. Currently, no mills are accepting any level of metal contaminated wood. Stands that are not marketable, due to metal contamination, and are deemed essential for RCW management may be managed using environmental funding.

Metal contamination surveys are conducted in areas that are known, or potentially contaminated with military bullets, or shrapnel. The area is surveyed using a metal detector to determine the type, extent and severity of the contamination. As the survey proceeds, each potentially contaminated tree is flagged and the location of the metal contamination in the tree is painted. Once the survey for metal contamination has been completed for the stand, the trees suspected of

metal contamination are located to determine the type and extent of contamination. The next step is to determine the type of metal contamination, and if those contaminated trees can be differentiated from other trees in the stand. Stands are then separated into similar types to facilitate a timber sale.

Stands that need a survey for metal contamination are first located on historic photos and maps. The location of the stand on the landscape enables the planner to find and determine the existence of old ranges and thereby determine the direction of fire. Combining historic photos with historic harvest maps may provide clues on the extent of metal contamination and the direction on the trees to look for metal contamination. Adding a topographic map provides information on the area where contamination may most likely be found. In addition, the topographic map provides the approximate height of the contamination on the tree.

A large volume of merchantable timber on Fort Jackson is located in outer limits of existing firing range safety fans. A small portion of this area is adjacent to existing ranges, which are in constant use. This heavy use by the military precludes entry for timber harvesting purposes except during "Block Leave", or during other short periods when ranges are not scheduled. Much of the area is affected by ranges that are not used continuously. Harvesting operations can be coordinated within these areas, but entry in these areas is frequently limited. In addition, changes in firing schedules sometimes require the contractor to alter work plans on short notice. Therefore, stands adjacent to these areas but not within the restricted areas may be harvested to facilitate the harvest of restricted areas.

These conditions complicate timber sale administration to a much greater degree than on other public or private forest land. As a result, local buyers resist buying the metal contaminated forestry products especially in the sawtimber market. Careful timber sale planning helps minimize this resistance by, subdividing sale areas into practical timber harvesting units, providing accurate sale information that is usable by the contractor, and making every effort to accurately determine the extent and type of metal contamination, and the timber products that are available.

Most unmarketable stands are in the 60 year old and older age class. In the immediate future these contaminated stands, which are considered to be unmarketable, will be needed for cavity trees and forage habitat, due to the shortage of both. One method for managing these stands would be to cut and remove the stems to be thinned. However, this method would be very costly. An alternative would be to thin by selectively removing trees by injecting herbicide into the main stem. Another alternative for younger stands would be to thin by burning the stand during the growing season. This would reduce the number stems in a less systematic manner and the resulting basal area would be unpredictable. Too much or not enough basal area could potentially be removed with this method, and forest pests could be encouraged into the site as a result. These alternatives will need to be tried and tested to determine which work and under what circumstances they work.

4.5.6.4 Timber Harvest

The annual harvest of timber products on Fort Jackson consists of sales ranging in size from 150 600 acres. These small sales, rather than one or two larger sales, have proven to be the most effective method of timber disposal. Smaller sales tend to invite competitive bidding from both

large and small producers. Smaller sales reduce and simplify the bidders risk when metal contamination is encountered.

Most timber sales on the installation involve a combination of four products, sawtimber, chip & saw, pulpwood, and fuelwood. Occasionally poles, pilings, veneer, and fence posts are also harvested. Where more than one product is to be harvested, the order of merchantability is dictated by stumpage values. Those values, from highest to lowest, are piling, poles, veneer, sawtimber, chip & saw, pulpwood, fence posts, and fuelwood.

Initially, silvicultural prescriptions are coordinated with the Wildlife Branch to determine the highest priority for RCW habitat improvement. All prescriptions are submitted to the Fort Jackson Environmental Management Branch for environmental review on a Record of Environmental Consideration (REC) form. The Wildlife Branch provides comments on the REC and forwards the information to the USFWS for final concurrence, if necessary.

Reports of timber availability are prepared and submitted by a Forester to the U.S. Army Corps of Engineers, Savannah District Engineer. This report includes, estimated timber sale volumes by product marked in each sale area, specifications to be included in the contract, description, level of metal contamination, GPS/GIS generated maps of each sale area, and other detailed information.

Timber sales are inspected daily by Fort Jackson forestry personnel. Close coordination is maintained between the Fort Jackson Forester and the District Engineer Resident Forester in all timber sale activities. Contract violations are reported to the Resident Forester rather than the contractor unless there is an emergency. Final completion reports are submitted to the Fort Jackson Forester for all timber sales in progress. Both monthly and annual reports are furnished by the Resident Forester listing volume and value by contract of all products harvested during that period.

Contract clearance reports are submitted by the U.S. Army Corps of Engineers, Savannah District Engineer to the Fort Jackson Forester for final inspection of the sale area. A thorough inspection is made particularly noting the utilization of all marked trees, sawtimber tops, cutting unmarked trees, removal of limbs, logging debris in the roads and firebreaks, and minimum stump heights.

Firewood is provided to individuals for personal use without charge. The firewood permits are without cost, because the cost to administer the collection of fees would be cost prohibitive. Firewood is issued on a permit based on the number of truckloads. Most firewood comes from areas where reforestation, or blow-down has occurred, or where roads and breaks are being day-lighted. Not all standing dead trees are harvested, some are left for wildlife den trees.

4.5.6.5 Timber Sale Planning

Timber sales are administered by U.S. Army Corps of Engineers, Savannah District Engineer personnel. General sale plans are coordinated by the installation Forester and Resident Forester with the Savannah District. However, detailed timber sale planning must take place before timber marking begins, if efficient sales are to be administered, continuous income is to be maintained, and endangered species are to be conserved.

The initial phase of a timber sale is to perform an analysis of an up-to-date forest inventory. Stands that are stocked with at least 80 square feet of pine basal area per acre, or greater are targeted for thinning. Stands are then grouped based on stand location, potential for metal contamination, possible products to be harvested (poles, pilings, sawtimber, pulpwood, and fuelwood), and accessibility of that training area. Present and future requirements of military training, endangered species, and also maintaining the health and vigor of the forest dictate the priority that stands will be harvested. These stands are then field checked to verify the validity of the inventory data.

The next step is to prepare the stands for a field examination. The first step of examination is to conduct a metal contamination survey (refer to the section on metal contamination for further details). The next step is to perform a timber inventory to determine volume (or use existing forest inventory data if current), type of products, and an estimate of value. Volume to be harvested determines the type of timber sale. Small volume sales are designated salvage type sales, and larger volumes are designated commercial type timber sales. Stands are then grouped into level of metal contamination, forest product, and type of timber marking/timber harvesting method. Estimated volumes are then used by the Forester to develop the annual timber availability. The annual timber availability is sent to Army Environmental Command (AEC), and the U.S. Army Corps of Engineers, Savannah District Engineer, and the Resident Forester. The availability provides the District Engineer, Resident Forester, and AEC with the estimated volume, and approximate value of Fort Jackson timber sales for the upcoming fiscal year.

Timber stands that are sufficiently stocked, do not impact training, and are deemed accessible for harvest, are submitted to the Environmental Management Branch for environmental review in the form of a timber prescription. Timber prescriptions, along with a map, are submitted with a Record of Environmental Consideration (REC) to the Environmental Management Branch. The REC ensures all necessary environmental review has been completed. Receiving the Memorandum of Environmental Consideration (MOEC) is the final step of the environmental review process. Any environmental restrictions and/or recommendations are incorporated into the MOEC. Once the MOEC has been received, the next phase of timber sale preparation can begin. The final steps to timber sale planning are; flagging and marking boundaries, using GPS to map boundaries, timber marking, cruising the timber, and completing the timber availability. These steps in the timber sale planning process are formalized into the Fort Jackson “Standard Operating Procedures, for Silvicultural Management Control” (Appendix 6).

4.5.6.6 Timber Marking

See Appendix 6 of the Fort Jackson “Standard Operating Procedures, for Silvicultural Management Control” for more information on Timber Marking

4.5.6.7 Timber Cruising

See Appendix 6 of the Fort Jackson “Standard Operating Procedures, for Silvicultural Management Control”.

4.5.7 Reforestation

4.5.7.1 Planting

Planting of available open land began on Fort Jackson in 1953. Initially, planting was first limited by lack of adequate personnel and equipment and the shortage of a seedling supply that existed throughout the state until 1959. After procurement of a Fleco Undercutter, large areas could be prepared for reforestation, but planting was limited to what could be accomplished by Fort Jackson Forestry. Hand planting of sizeable areas was beyond personnel capabilities, and machine planting was hampered by the rough condition of the land after undercutting. The Forestry Funding Program established in 1962, provided the solution to the reforestation bottle neck, and large areas were hand planted under contract. All available open land on the installation was reforested to slash pine. However, surveys of slash pine plantations have shown that most of these stands planted on the sand hill ridges have stagnated. A restoration program began in the late 1980's to restore these slash pine plantations to longleaf pine. This restoration program is also being applied to all available scrub oak type stands. Slash pine seedlings were used in most early plantings with exception of small red cedar, Arizona cypress, and white pine plantations established for Christmas trees and ornamental use on the installation. Today, all pine stands are regenerated with longleaf pine, with limited areas restored to shortleaf pine. When the longleaf pine restoration program began in the 1980's, both bare root stock and containerized seedlings were used to establish longleaf pine plantations. Currently only containerized longleaf pine seedlings are being planted. Areas planted with shortleaf pine, will be planted with either containerized seedlings (preferred), or bare root stock, depending on availability.

Once the off-site pine species have been removed, the area is chemically treated to control hardwood and grass competition, depending on site conditions. Imazapyr is the chemical that is used to control hardwood competition. Imazapyr is applied in late summer to fall, and is used to control hardwoods on areas that have had off-site pines removed, prior to planting and can also be used as a mid-rotation release. Unwanted grass competition, and shrubs are controlled using metsulfuron, sulfometuron and/or glyphosate.

4.5.8 Protection from Insects

4.5.8.1 General

To date, the only forest insect which poses a serious threat is the southern pine beetle (SPB). SPB's are a bark beetle pest that attacks pines throughout the south. Although serious outbreaks of SPB's have occurred in counties to our west in recent years, Fort Jackson has not experienced any major outbreaks. Spot infestations of ips engraver beetles (Ips spp.) and black turpentine beetles (Dendroctonus terebrans) have and continue to occur on the installation. Ips and black turpentine beetles usually start in trees damaged by fire, lightning, or vehicles and these infestations are small and isolated. Normally in these cases, salvage harvesting is not practical and the trees are either left standing for snags to be used by wildlife or may be pushed over using a crawler tractor.

4.5.8.2 Prevention and Detection

Maintenance of a healthy forest through proper management appears to be the best preventive measure. Observation of stand conditions is a routine procedure practiced by forest management personnel, with any symptoms of infestation or stand deterioration being investigated as to cause, and any indicated corrective action is taken promptly.

4.5.8.3 Corrective Action

See section 5.3.3 Forest Pest and Disease Management of the Fort Jackson ESMC for the RCW (Appendix 2) for more information on corrective action of forest pests.

4.5.9 Road and Firebreak and System

4.5.9.1 General

Firebreak boundaries of 20-30 feet wide have been constructed around the concentrated impact areas of all live-fire ranges on Fort Jackson. Culverts have been installed on stream crossings to facilitate rapid fire suppression response. On small arms ranges, these firebreaks extend on both sides of the firing line for about one mile where a back firebreak joins the two sides to encircle the area. These are not the safety limits of the range but firebreaks designed to enclose the area receiving concentrated fire and ricochets of tracer ammunition. Combined range complexes such as the West Impact Area are considered as one common impact area and in addition to encircling boundaries, interior firebreaks are maintained across the impact areas to sub divide them into smaller sections for prescribed burning purposes and to provide access. Firebreak boundaries for ranges using explosive munitions are constructed to widely encircle target impact areas because these areas are too hazardous to use a crawler tractor and fire plow to suppress a wildfire.

The Forestry Branch is responsible for maintenance of some secondary unimproved dirt roads, and all firebreaks on Fort Jackson, excluding the area licensed to the SCARNG. The SCARNG is responsible for road and firebreak maintenance within their licensed area. A motor grader is used to remove flammable debris, and maintain turn-out ditches. A crawler tractor maintains roads and firebreaks by pushing back debris that has grown into the original footprint of the road. Low water crossings and culverts are installed or replaced as needed. Occasionally, fill dirt is brought in to build up roads that may either have very sandy soils or low wet features. This gives military trainers and other users' critical access to training areas. Because of firing schedules, road maintenance on ranges is usually done on holidays, Block Leave and periods when the ranges are not scheduled.

4.5.9.2 Maintenance

Approximately 400 miles of unimproved dirt roads and firebreaks, outside of the impact area, are maintained twice per year. Unimproved dirt roads and firebreaks within the East and West impact areas are maintained at least once per year depending on range scheduling availability.

4.5.10 Fire Management

Fire is both a threat to natural resources and, if used properly, a valuable ecosystem management tool. The following sections describe methods used by Fort Jackson to protect natural and human resources from wildfires, and the use of the prescribe fire to ensure continued ecosystem functionality, silvicultural management, and endangered species management.

4.5.10.1 Current Management

Fort Jackson has a much greater fire occurrence potential when compared to other forests under private and public ownership. This is primarily due to the large number of military personnel engaged in training and the presence of live firing ranges using tracer and incendiary ammunition.

For this reason, the mission of providing adequate forest fire protection is more complex and costly than operations on other forested areas. Methods and procedures discussed in this section have been developed to fit installation requirements to provide adequate protection in the most cost effective manner. Additional information about prescribe burning and wildfire suppression is located in the Integrated Wildland Fire Management Plan (IWFMP) in Appendix 5.

See the IWFMP (Appendix 5) for more details on Wildfire Suppression.

See the IWFMP (Appendix 5) and ESMCs (Appendices 2 & 3) for details on prescribe burning.

4.5.11 Cooperation with other Agencies

A cooperative agreement between Fort Jackson and the South Carolina Forestry Commission has been in effect since 1953. This agreement provides mutual assistance in suppression of forest fires near installation boundaries as requested by either organization. Coordination is also maintained, in accordance with the agreement, between Fort Jackson and the state in detecting and locating fires both on and off the installation.

4.6 VEGETATIVE MANAGEMENT

Vegetative Management on Fort Jackson is accomplished through implementation of actions described in various sections of this plan to include; Forest Management (Section 4.5), Fish and Wildlife Management (Section 4.4), ESMC’s (appendices 2 and 3), and the Integrated Pest Management Plan.

4.7 MIGRATORY BIRDS MANAGEMENT

There is a continental-wide concern over declining numbers of many nongame birds, especially neotropical migratory birds and many resident landbird species. In cooperation with various regional, national, and international efforts; Fort Jackson is monitoring population trends and analyzing habitat preferences for many of these species that occur on the installation.

In July 2007, the U.S. Fish and Wildlife Service and the Department of Defense, signed a memorandum of understanding to outline the responsibilities of each agency in the protection of migratory birds. Both parties agree that migratory birds are important components of biological diversity and that the conservation of migratory birds will both help sustain ecological systems and help meet the public demand for conservation education and outdoor recreation, such as wildlife viewing and hunting opportunities. The parties also agree that it is important to: 1) focus on bird populations; 2) focus on habitat restoration and enhancement where actions can benefit specific ecosystems and migratory birds dependent upon them; and 3) recognize that actions taken to benefit some migratory bird populations may adversely affect other migratory bird populations.

Military lands like Fort Jackson contain habitat building blocks, especially in areas where human impacts have been minimized. A goal of Fort Jackson's bird conservation efforts is to maintain fully functioning natural ecosystems that can provide for the needs of various and differing species. Maintaining ecological processes and the species that depend on them across landscapes that are intensively used by people and training is essential to planning. By incorporating holistic ecosystem management into the INRMP, Fort Jackson is adopting habitat-based conservation measures grounded in sound science, effective partnerships, and adaptive natural resources management that will benefit bird conservation. In some cases, training activities help maintain healthy, functioning ecosystems, such as grassland ecosystems dependent upon periodic fires; or benefit birds, such as those that require some light ground disturbance. Additionally, conserving wildlife habitats and biodiversity helps minimize future listings of species.

Fort Jackson will utilize information from Partners in Flight (www.dodpif.org) which provides a scientific foundation for DoD to maximize effectiveness of management resources, enhance the biological integrity of our lands, and ensure continued use of lands to fulfill military training requirements. Participating in broad-scale partnerships also helps us to more effectively meet our trust responsibility to conserve our nation's biodiversity.

The Migratory Bird Treaty Act (MBTA) of 1918, as amended and EO 13186 of January 10, 2001, Responsibilities of Federal Agencies to Protect Migratory Birds specifically protects migratory birds. The MBTA makes it illegal to pursue, hunt, kill, capture, possess, buy, sell, purchase, or barter any migratory bird, including the feathers or other parts, nests, eggs, or migratory bird products, except as allowed by the implementing regulations. EO 13186 requires that Federal agencies avoid or minimize the impacts of their activities on migratory birds and make efforts to protect birds and their habitat. Implementation of this INRMP will not adversely affect migratory birds at Fort Jackson. INRMP implementation benefits migratory bird species through the implementation of projects, including preservation of wetlands, nest box programs, and migratory bird surveys. A detailed discussion on Fort Jackson's migratory bird management strategy is provided in Appendix 4.

Migratory birds face serious challenges, including habitat loss, collisions with artificial structures, and environmental contaminants, resulting in species decline. Because migratory birds cross the boundaries of nations, watersheds, and ecosystems, protecting them requires a coordinated effort involving multiple jurisdictions and interests. However, the 2003 National Defense Authorization Act exempts the Armed Forces from the incidental taking of migratory birds during military readiness activities. Military readiness activities include all training and operations of the Armed

Forces that relate to combat and the adequate testing of military equipment, vehicles, weapons and sensors for proper operation and suitability for combat use. The MBTA also requires that the Secretaries of Defense and Interior identify ways to minimize, mitigate and monitor the take of migratory birds during military readiness activities.

Although exempt, the U.S. Army is responsible for monitoring the potential impacts to migratory birds from military readiness activities. This monitoring will be carried out in conjunction with monitoring and management conducted under EO 13186 as specified in the Memorandum of Understanding between the DoD and the USFWS to Promote the Conservation of Migratory Birds dated 31 July 2006, and in DoD Guidance to implement said memorandum dated 3 April 2007.

4.7.1 Management Strategies

a) Implementation of the following management measures will minimize, mitigate and monitor the take of migratory birds from military readiness activities at Fort Jackson.

b) Continue the nest box program on Fort Jackson as discussed in Section 4.4.7.9 of the Wildlife Management Practices Section.

c) Implement the requirements of the MOU between USFWS and DoD to promote the conservation of migratory birds (Appendix 4).

d) Implement the program-wide goals and objectives of the DoD Partner In Flight program (Appendix 4, www.dodpfi.org).

e) Implement habitat enhancement for migratory bird species.

f) Where possible, Fort Jackson will enter into conservation partnerships with Federal, state and local agencies and non-governmental organizations to improve habitat and allow for bird research on the installation.

g) Implement the IPMP to reduce pesticide use on Fort Jackson.

h) Control invasive species that compete with migratory bird species and their habitats.

i) Where possible, site military readiness activities in ways to avoid or minimize impacts to migratory birds. If Fort Jackson notes clear evidence of bird take as a result of military readiness activities, Fort Jackson will document the take, evaluate these activities and where practicable, reduce or eliminate the take of migratory birds. If the take cannot be eliminated, the amount of take will be documented and, where practicable, mitigated for by other management.

j) For non-military readiness activities, compliance with the MBTA is mandatory.

4.8 INVASIVE SPECIES MANAGEMENT

Executive Order No. 13112, signed by the President on 3 February 1999, requires each Federal agency, to the extent practicable and permitted by law and subject to the availability of appropriations, to use relevant programs and authorities to, among other things:

- prevent the introduction of invasive species
- detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner
- monitor invasive species populations accurately and reliably
- provide for restoration of native species and habitat conditions in ecosystems that have been invaded.

Additionally, each agency is prohibited from authorizing, funding, or carrying out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions. An exemption from the preceding requirement is permitted to the Department of Defense when the Secretary of Defense finds that exemption is necessary for national security reasons.

Feral pigs (Sus scrofa) and European Starling (Sturnus vulgaris) are the only invasive vertebrate species on Fort Jackson. Due to the potential for significant damage to wildlife habitat and training lands, current effort is directed toward controlling feral pigs. Section 4.4.7.11 describes the actions taken to address this invasive species.

Invasive plant species surveys conducted on Fort Jackson have resulted in the identification of nine plant species that are considered to be invasive (Table 4-8). Of these nine, five (Chinese privet, Japanese honeysuckle, Japanese shade grass, kudzu, and Chinese wisteria) have an invasive threat level of "severe", according to the S.C. Exotic Pest Plant Counsel. This rating means these species are aggressive and can out-compete native species quickly.

None of the invasive plant species are currently found in wide-spread large populations, but are found in high densities in a few locations. This offers opportunities for control prior to their spread over larger areas. Herbicide applications are the preferred method of control for most of these invasive species. Prescribed fire and mechanical control may be implemented in combination with the use of herbicides to sufficiently control these species.

TABLE 4-8 Invasive Plants on Fort Jackson

Albizia julibrisin (mimosa)
Lespedeza bicolor (bicolor lespedeza)

Lespedeza cuneata (sericea)
Ligustrum sinense (Chinese privet)
Lonicera japonica (Japanese honeysuckle)
Melia azedarach (Chinaberry)
Microstegium vimineum (Japanese shade grass)
Pueraria montana (kudzu)
Wisteria sinensis (Chinese wisteria)

4.9 PEST MANAGEMENT

Pest Management Operations on Fort Jackson are guided by the Fort Jackson Integrated Pest Management Plan (IPMP) as required in AR 200-1. The IPMP (appendix 8) is an internal Army compliance and management plan that integrates pest management requirements and activities with ongoing mission activities, allows for quick identification of potential conflicts between the Installation's mission and pest management, and identifies compliance actions necessary to maintain the availability of mission essential properties. The objective of the IPMP is to use an integrated pest management approach for the judicious use of both non-chemical and chemical control techniques to achieve effective pest control with minimal environmental impacts. The IPMP identifies 10 general categories of pests that cause significant damage and require control or management:

- Disease vectors and public health pests (mosquitoes, ticks, fleas, and rodents);
- Noxious and invasive plants (noxious weeds and animals);
- Other undesirable vegetative (weeds);
- Structural pests (termites, carpenter ants);
- Pests found in and Around Buildings (ants, cockroaches etc.);
- Turf and ornamental (white grubs etc.);
- Vertebrate pests (squirrels, mice, beaver, alligators, stray animals, etc.);
- Quarantine and regulated pests (imported fire ants, gypsy moths); and
- Other Pest Management Requirements (large game animals, road kills, etc.).

The IPMP describes the pest management requirements and outlines the resources necessary for surveillance and control of pests. It also describes the administrative, safety, and environmental requirements of the program. The program involves Department of Defense (DOD) and South Carolina certified pesticide applicators; staffs of the Directorate of Public Works (DPW) Environmental Division and Contract Management Branch, Preventive Medicine Services and Veterinary Activity; building occupants and facility managers to monitor and control pests. Pests included in the plan are: weeds and other unwanted vegetation; termites; ticks, mosquitoes and other biting insects; vertebrate pests, such as birds, rodents, and snakes; flying and crawling insects; and spiders. These pests can interfere with the military mission, damage real property, increase maintenance costs, lower morale, and expose personnel to diseases unless properly controlled. All barracks, offices, dining facilities, warehouses, schools, golf courses, child development centers, hospital, ranges and all surrounding areas inside the property of Fort Jackson are covered for pest control services through contract with a private company. Actual pest management procedures are found in the Integrated Pest Management Outlines of the IPMP.

All pest management actions are reviewed for their potential impacts to natural resources prior to implementation.

4.10 LAND MANAGEMENT

4.10.1 Soil Erosion and Sediment Control

Soil erosion occurring in the training areas of Fort Jackson is being addressed primarily through the Integrated Training Area Management (ITAM) Land Rehabilitation and Maintenance (LRAM) program.

Fort Jackson's goal is to manage the lands in such a manner as to control soil erosion and improve and protect the quality of water, vegetation and soils. This goal is achieved by implementation of the following objectives:

a) Survey training areas to assess needs through the ITAM Range and Training Land Assessment (RTLA) program.

b) Rehabilitate and maintain training lands through the LRAM component of ITAM.

c) Maintain a GIS database of erosion sites.

d) Implement Best Management Practices to control erosion.

e) Control erosion on maneuver trails and training areas.

Fort Jackson has a State of South Carolina NPDES General Permit for Stormwater Discharges from Regulated Small Municipal Separate Storm Sewer Systems (SCR037901). There are six components of the permit; public education and outreach, public involvement/participation, illicit discharge detection and elimination, construction site storm water runoff control, post-construction storm water management in new development and redevelopment, and pollution prevention/good housekeeping. Water quality monitoring is also a requirement of this permit. While some may consider this MS4 Stormwater program environmental in nature, it is also connected to natural resource management through erosion control and water quality issues.

Another aspect of the erosion control program at Fort Jackson involves construction sites. Under the Clean Water Act NPDES program and the South Carolina Stormwater Management and Sediment Reduction Act, land disturbing activities one acre and greater are required to develop and implement Stormwater Pollution Prevention Plans (SWPPP), which are approved DHEC in South Carolina. These plans address stormwater runoff volumes and sediment and erosion control. This program ultimately benefits the natural resources of Fort Jackson and the surrounding community by reducing the velocity of runoff from developed areas, thus reducing stream bank erosion and flooding and by minimizing the amount of sediments that enter streams, lakes, and wetlands.

4.10.2 Non-point Source Pollution

Water Resource Permits

Fort Jackson has received National Pollutant Discharge Elimination System (NPDES) permits that enable the installation to discharge stormwater to waters of the United States and the State of South Carolina. For non-point source discharges, Fort Jackson has a South Carolina NPDES General Permit for Stormwater Discharges Associated with Industrial Activities (SCR001892), NPDES General Discharge Permit for Discharges Associated with Nonmetal Mineral Mining Facilities (SCG731156), and NPDES General Permit for Stormwater Discharges from Regulated Small Municipal Separate Storm Sewer Systems (SCR037901).

The DLA/DSJ and Recycling Center facilities are covered under the Industrial General Permit. These facilities are inspected quarterly and stormwater samples are collected quarterly during storm events. Personnel at these sites are trained annually in spill response and prevention, as well as general housekeeping measures to prevent pollution from entering nearby waterbodies. The Wildcat Borrow Pit off firebreak 11 is covered by the Nonmetal Mineral Mining General Permit and has the same inspection and sampling requirements as the Industrial General Permit.

There are six components of the Small MS4 General Permit; public education and outreach, public involvement/participation, illicit discharge detection and elimination, construction site stormwater runoff control, post-construction stormwater management in new development and redevelopment, and pollution prevention/good housekeeping.

Construction sites on Fort Jackson operate under the NPDES General Permit for Stormwater Discharges from Construction Activities (SCR100000). Each construction site, which disturbs one acre and greater, must develop a Stormwater Pollution Prevention Plan (SWPPP) and obtain individual coverage under the general permit. Fort Jackson is considered a Qualifying Local Program (QLP) through SCDHEC and performs SWPPP reviews in-house. The Notice of Intent (NOI) and Fort Jackson approval letter are sent to SCDHEC to obtain permit coverage.

4.11 AGRICULTURAL OUTLEASING

Fort Jackson does not maintain an agricultural outleasing program.

4.12 GEOGRAPHIC INFORMATION SYSTEMS (GIS) MANAGEMENT

Mapping and spatial analysis are integral components of natural resources management that are fulfilled through the use of geographic information system (GIS) data and software. Data provides documentation for the location and attributes of resources while software contains the tools necessary for the management, display, and analysis of these data.

Data is maintained locally at the Directorate level. However, periodically data must be transferred to the U.S. Army for final approval and integration with a U.S. Army enterprise database. The Installation Geospatial Information and Services Coordinator, who organizes all the Garrison GIS activities, delivers completed GIS data to the Command Level Authority, who is typically the

Garrison Commander, for final approval. Finally, the data are forwarded up through regional and national levels for approval and is appended to the U.S. Army GIS database. From this database these data can be accessed online from an interactive mapping website called the Army Mapper.

4.12.1 GIS Data Use and Development

The Fort Jackson Environmental Division uses GIS mapping capabilities for daily decisions as well as long term planning of natural resources management and its integration with the Army mission. This work is driven by laws such as the NEPA, ESA, and CWA. For NEPA compliance, all impacts to Federal land from a proposed project and it alternatives must be considered before the project can be implemented. These impacts are frequently to natural resources such as endangered species, water, and timber, so detailed maps are required to assess the impacts on them. A list of SDSFIE data layers that the Environmental Division maintains and the SME positions responsible for that maintenance is available from the DPW.

The branches and offices within the Environmental Division keep GIS databases of these resources including endangered plant and animal inventories, hydrograph data such as streams and wetlands, cultural resource data, and environmental compliance data. The Wildlife and Forestry Branches maintains numerous GIS data layers. The Wildlife Branch maintains data for hunting and fishing areas, food plots, and endangered species. The Forestry Branch maintains data for forest management such as a forest stand inventory, fire breaks, and prescribed burning locations. Along with these data the Environmental Division also stores ancillary data that can affect a project such as infrastructure, boundaries, and geodetic reference points. Data for the Army's training mission such as training area boundaries, live-fire ranges, and training impact areas are maintained by the DPTMS ITAM office.

4.13 OUTDOOR RECREATION

4.13.1 General

Fort Jackson is a large, relatively undeveloped, open space. This open space and outdoor recreation opportunities associated with it are perhaps the installation's best natural attributes in terms of community quality of life, particularly considering its location adjacent to the city of Columbia.

Outdoor recreation enhances the quality of life for military and civilian personnel. As such, Army lands with suitable natural resources are to be managed to allow outdoor recreational opportunities, consistent with the Sikes Act. For the purposes of this INRMP and to be consistent with DoD Directive 7400.4 and AR 200-1, outdoor recreation is defined as recreational programs, activities, or opportunities that depend on the natural environment. Examples include hunting, fishing, horseback riding, picnicking, bird-watching, hiking, and camping. Developed or constructed facilities and activities, such as golf courses, tennis courts, baseball facilities, etc., are not included.

4.13.2 Military Mission Considerations

The military mission has priority over outdoor recreation involving range access. If outdoor recreational activities are to continue to thrive on Fort Jackson, this military mission priority must

not be compromised. If recreational or management activities conflict with military activities, the military mission comes first.

4.13.3 Public Access

There are many opportunities for the general public to participate in installation activities. In maintaining a policy of public access, Fort Jackson relies on a responsible public to adhere to restrictions placed on access. Fort Jackson limits access for hunting and fishing to authorized personnel only (see section 3.5.1.). While unsupervised use by the general public is prohibited, Fort Jackson does allow non-affiliated civilians of the general public to participate in hunting and fishing activities when sponsored and supervised by an authorized participant.

Fort Jackson has a long tradition of sharing its renewable natural resources with the local community. However, the general public is denied hunting and fishing access except for a large community-wide event called the Pure Fishing Derby organized by DFMWR, as well as through a guest hunting and fishing permitting program and one or two annual Managed Big Game Hunts. The Pure Fishing Derby event hosts anywhere from 500-750 participants from the local and Fort Jackson communities. This event encourages new anglers and experienced anglers to mix and mingle with a multitude of prizes and free food.

Fort Jackson provides outdoor resources for numerous users annually, including about 1,900 permitted consumers of fish and wildlife resources. Most of Fort Jackson is available to hunting and angling when not being used for military training. In addition, anglers almost always have access to ponds within the cantonment area.

Public access for outdoor recreation activities is also available via the passage of the Palmetto Trail through Fort Jackson. The Palmetto Trail runs across the breadth of South Carolina, connecting the mountains to the coast. The section of the Palmetto Trail that traverses Fort Jackson offers the public access for hiking, biking, bird and other wildlife viewing, and access to a spur trail named the Harry J. Vann Interpretive Trail. This spur was constructed by the South Carolina National Guard, in celebration of National Public Lands Day, in September 2000. This project was made possible by a grant from the *National Environmental Education & Training Foundation* and the work of several volunteers and agencies.

The purpose of this trail is to help educate and provide recreational opportunities to the citizens of South Carolina. This trail provides an opportunity to share this land and our conservation ethic. The trail contains several interpretive signs and an outdoor classroom. The trail is open to individual hikers 1 hour after sunrise to 1 hour before sunset. Groups and organization need to schedule use of the trail through the SCARNG Environmental Resource Center at (803) 299-2349.

FMWR assists in Palmetto Trail access through coordination with DES Physical Security. A non-affiliated user will contact FMWR with expressed interest in hiking the Palmetto Trail. FMWR will provide the Requests for NCIC (Background) Check form. The non-affiliated user will fill it out and bring it to the Physical Security office to begin their check. Once the check

has been verified, the non-affiliated user will be issued a DBIDS Card, which will allow the non-affiliated user access to the trail for up to a year.

4.13.4 Hunting and Fishing Administration

DFMWR is responsible for the overall execution of the Fort Jackson hunting and fishing program. A major component of program execution is coordination with DPTMS. DPTMS provides DFMWR a list of training areas available for hunting and fishing each week. Any changes to the training schedule are immediately reported. Also, if soldiers enter an area being hunted, hunters must immediately vacate that area. If an area has to be closed during a hunt, game wardens or Range Operations will sound three blasts on a siren or horn to warn hunters to vacate the area. All persons entering authorized hunting, fishing, and scouting areas must sign out and in at the Big Game Check Station at Heise's Pond. The Fort Jackson system is safe and requires commitment, training, and attention to detail on the part of hunters and anglers.

4.13.5 Hunting and Fishing Regulations

The SCDNR issues regulations for hunters and anglers in South Carolina, including those who use Fort Jackson. Fort Jackson Regulation 28-4, Hunting and Fishing Regulation (Appendix 9) and SCDNR regulations on hunting and fishing are primary means of establishing controls on hunting and fishing on Fort Jackson.

4.13.6 Fort Jackson Permits and State Licenses

Any person 16 years of age and older who hunts or fishes on Fort Jackson must have in possession a valid Fort Jackson hunting or fishing permit and a Richland County or South Carolina hunting or fishing license. In addition, persons hunting waterfowl must have a federal and a South Carolina duck stamp. All migratory bird hunters must have in possession a State Migratory Permit (waterfowl and dove). There are exceptions to permit requirements. For instance, military personnel on leave who are legal residents of South Carolina and stationed at installations outside of South Carolina are not required to purchase a South Carolina or Richland County hunting or fishing license and a Fort Jackson permit. Fort Jackson annually sells about 870 fishing, 660 guest fishing, and 430 hunting and 90 guest hunting permits.

Fees collected from the sale of Fort Jackson hunting and fishing permits are used for the protection, conservation, and management of fish and wildlife habitat and for certain operational costs of conducting hunting and fishing activities. Recreational activity fees are also charged to defray Non Appropriated Fund costs for conducting activities.

4.13.7 Sign Out Procedures

All persons entering authorized hunting, fishing, and game scouting areas must sign out and in at the Big Game Check Station located at Heise's Pond Recreation Area. The sign out/in process is described in Fort Jackson Regulation 28-4.

4.13.8 Safety Considerations

Sports and recreational activities on Fort Jackson must be regulated to avoid conflicts between the military mission and recreation. Recreational users are required to follow sign out/in procedures. Safety rules must be followed during each recreational activity. The no hunting buffers, drawings for certain hunts, and other safety precautions (e.g., weapons and ammunition restrictions for still hunting and stand hunting of deer) foster safe hunting activities on the installation.

Fort Jackson requires hunters to attend hunter safety training. In addition, Fort Jackson hunters must attend a hunter safety briefing conducted by DFMWR.

4.14 BIRD / WILDLIFE AIRCRAFT STRIKE HAZARD

Fort Jackson does not maintain a Bird/Wildlife Aircraft Strike Hazard Program.

4.15 WILDLAND FIRE MANAGEMENT

Fort Jackson's wildland fire management is described in the Integrated Wildland Fire Management Plan (Appendix 5).

4.16 TRAINING OF NATURAL REOURCE PERSONNEL

4.16.1 Wildland Fire Personnel Training

DoD has recently adopted the National Wildfire Coordination Group's (NWCG) Federal Wildland Fire Policy to govern all wildland fire activities carried out by DoD personnel. DoD is presently exploring the possibility of seeking membership in the NWCG. The NWCG is made up of all Federal agencies (except DoD) with wildland fire responsibilities and the National Association of State Foresters. The Federal Wildland Fire Policy requires all personnel involved in prescribed fire and/or wildfire activities meet certain training and physical qualifications. DoD is presently reviewing how it will implement this requirement. Fort Jackson's requirements for personnel qualifications will be reviewed and the IWFMP will contain complete information on personnel qualifications.

4.16.2 Timber Marking

All personnel engaged in timber marking at Fort Jackson, at a minimum must meet the qualifications established by OPM for Forestry Technician GS 462-05. Additional training will be given in relation to local requirements and procedures. This training will be under actual field conditions in a productive capacity.

4.16.3 Pesticide Applicator Training

All Fort Jackson personnel who apply pesticides shall have received and maintained DoD (government staff) or South Carolina (contractors) certification as pesticide applicators for the categories of pest control engaged.

4.17 COASTAL/MARINE MANAGEMENT

Fort Jackson does not lie within an area controlled under a Coastal Zone Management Program. Therefore, Fort Jackson's on-post operations and activities are not managed or controlled by the Coastal Zone Management Program.

4.18 OTHER LEASES

Fort Jackson does not maintain any other leases related to natural resources on the installation.

5.0 IMPLEMENTATION

Over the course of its implementation, the INRMP will:

a) enable Fort Jackson to make progress towards achieving a sustainable natural resources base and a realistic training environment which is embodied in the diversity of the longleaf pine ecosystem;

b) establish appropriate stewardship policies that serve to protect both natural and cultural resources;

c) ensure compliance with environmental laws;

d) provide a continuity of direction and effort that can accommodate changes in personnel and leadership;

e) promote cost-effectiveness through better planning and coordination;

f) promote good public relations by demonstrating the installation's commitment to stewardship, as well as a multiple-use concept; and

g) make use of innovative strategies to accomplish specific management objectives.

5.1 Plan Implementation and Review

The DPW and DPTMS will develop annual work plans based on the requirements and funding of all program elements that comprise the INRMP. Detailed natural resources management prescriptions that drive the projects are provided in Appendix 11. The annual work plans to be developed for each FY will include a listing of projects, funding requirements, CLS supported, and manpower data to complete the action. This work plan will be used to track progress on INRMP implementation, budget expenses, request budget allotments for future months and coordinate needed manpower requirements for labor intensive projects. Each year the core government Natural Resources managers will meet as necessary to review plan implementation and discuss any necessary adjustments.

This in-process review (IPR) will serve to prioritize projects, resolve conflicts, coordinate implementation of specific provisions of the INRMP, identify common objectives so some projects may be completed by several partners, and identify the need for plan updates. The projects listed in the annual work plan will be assessed and revised as necessary. A list of prioritized projects will be developed at the beginning of each FY and reviewed and updated each quarter for the remainder of the year.

5.2 ACHIEVING NO NET LOSS

Historically, Fort Jackson has achieved a no net loss in the capability of military lands to support the mission of the installation. Implementation of the INRMP will ensure that there is no net loss in available military lands to support Fort Jackson's mission. The Wildlife and Forestry Branches have the primary role and responsibility for the implementation of the INRMP. The ITAM Office of DPTMS is also an integral participant.

The implementation of proposed projects, as described in this section and future revisions and updates of this INRMP to reflect emerging natural resources planning needs, assist Fort Jackson in achieving no net loss to the military mission. These projects focus on maintaining RCW habitat, assessing the impacts of military readiness activities on endangered species, controlling erosion and sedimentation in stream channels, implementing ecosystem management, managing the installation's forests, and providing for recreational opportunities.

To implement this plan and insure minimal impacts or conflicts with military training, frequent and close coordination between the Environmental Division and the DPTMS will be necessary. DPTMS schedules and manages training land use and needs to be aware of management actions within the training areas, especially those actions that involve contractors, or workers who are not a regular part of the Fort Jackson natural resources staff. In addition, the natural resources staff needs to be aware of when and where field training is occurring so work can be adjusted around those activities when necessary. DPTMS provides the Wildlife and Forestry Branches a list of the range and training areas scheduled for use on a regular basis to assist with work planning.

5.3 COOPERATIVE AGREEMENTS

Fork Jackson maintains the following cooperative agreements related to natural resources conservation:

- Interagency agreement with USDA Wildlife Services for support of the management of invasive wildlife species and animal damage control.

- Memorandum of Understanding between Fort Jackson, the South Carolina National Guard, the South Carolina Department of Parks, Recreation & Tourism, and the Palmetto Trails (Palmetto Conservation Foundation) for the passage of the Palmetto Trail through Fort Jackson.

5.4 FUNDING

All requirements set forth in this INRMP requiring the expenditure of the Fort Jackson's funds are expressly subject to the availability of appropriations and the requirements of the Anti-Deficiency Act (31 U.S.C. Section 1341). No obligation undertaken by Fort Jackson under the terms of this INRMP will require or be interpreted to require a commitment to expend funds not obligated for a particular purpose.

Unlike most functions within the Department of Defense, natural resources management relies on a variety of funding mechanisms, some of which are self-generating and all of which have different application rules. Below are general discussions about different sources of funding to implement this INRMP.

5.4.1 Forestry Funds

Forestry funds are generated from sale of forest products. Forestry funds are centrally controlled, and Fort Jackson is limited to recovering its approved expenses for forest management. The remainder of the money generated by the Fort Jackson forestry program is split between the U.S. Treasury and Richland County.

Only expenses that are directly related to the management of Forest Products Production Areas may be reimbursed from sale receipts and include: timber management, reforestation, timber stand improvement, inventories, fire protection, construction and maintenance of timber area access roads, purchase of forestry equipment and supplies, disease and insect control, cultural resources inventory and mitigation, timber marking, inspections, sales preparation, training of personnel, and timber sales.

5.4.2 Sikes Act Funds

Sikes Act funds (21X5095) are generated from the sale of Fort Jackson hunting and fishing permits. They are authorized by the Sikes Act. Funds may be used only for fish and wildlife management on the installation where they are collected. They have no year-end (unobligated funds carry over on 1 October). Fee collection and administration (i.e. printing and issuing the State Sikes Act Permit) costs (not to exceed 10% of the annual Sikes Act revenue) are authorized.

Monies accrued from the collection of Sikes Act Permit fees will be expended in support of the Fish and Wildlife Management Program on Fort Jackson and for no other purpose. Collections and disbursements will be accounted for in accordance with guidance provided for the appropriation titled “Wildlife Conservation, Military Reservations”, Army Account 21X5095 (Army Regulation 37-100 and 37-108). Unobligated balances shall be accumulated with current fee collections, and the total amount accumulated at the Installation will be available for obligation.

(Note: The protection and management of threatened and endangered species will not be funded from Sikes Act funds collected from hunters and anglers. These activities are stewardship responsibilities of Fort Jackson.)

5.4.3 Agricultural Funds

Agricultural funds are derived from agricultural leases on installations. They are centrally controlled at both Department of Army and IMCOM levels with no requirements for spending where they were generated. They are primarily intended to offset costs of maintaining agricultural leases, but they are also available for preparing and implementing INRMPs.

Fort Jackson has no agricultural leases. Thus, the major use of these funds would be implementation of this INRMP. The installation rarely receives agricultural funds.

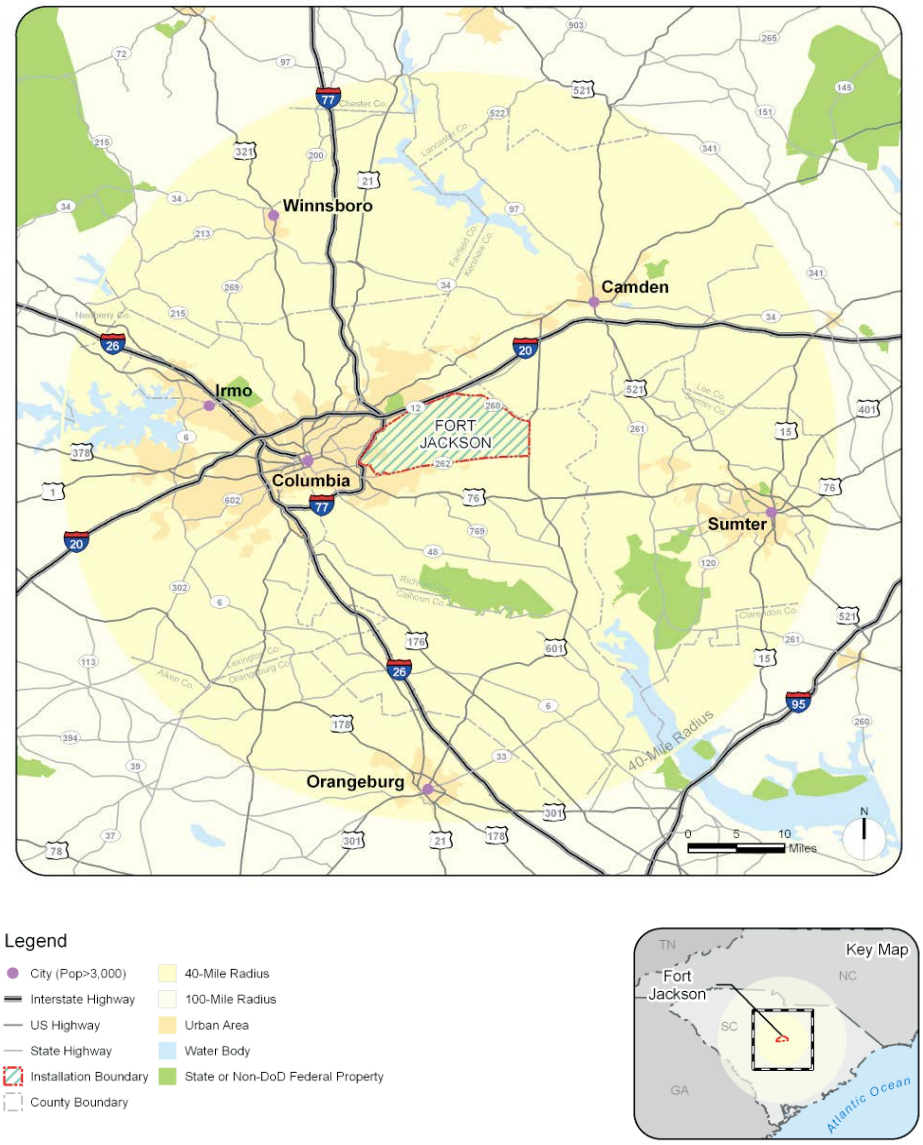
5.4.4 Environmental Funds

Environmental funds are a special subcategory of Operations & Maintenance (O&M) funds. Compliance with laws is the key to getting environmental funding. The program heavily favors funding high-priority needs to reach or maintain compliance with federal or state laws, such as the Endangered Species Act.

5.4.5 Range Program Funds

Range Program Funds are utilized to implement the ITAM program. Funding is provided for the management and maintenance of training lands to sustain and enhance the capability to meet long-term training requirements. ITAM funding does not pay for projects which qualify as Conservation Compliance as defined in the Environmental funding budget guidance.

FIGURE 1



Legend

- City (Pop>3,000)
- Interstate Highway
- US Highway
- State Highway
- Installation Boundary
- County Boundary
- 40-Mile Radius
- 100-Mile Radius
- Urban Area
- Water Body
- State or Non-DoD Federal Property

FIGURE 2

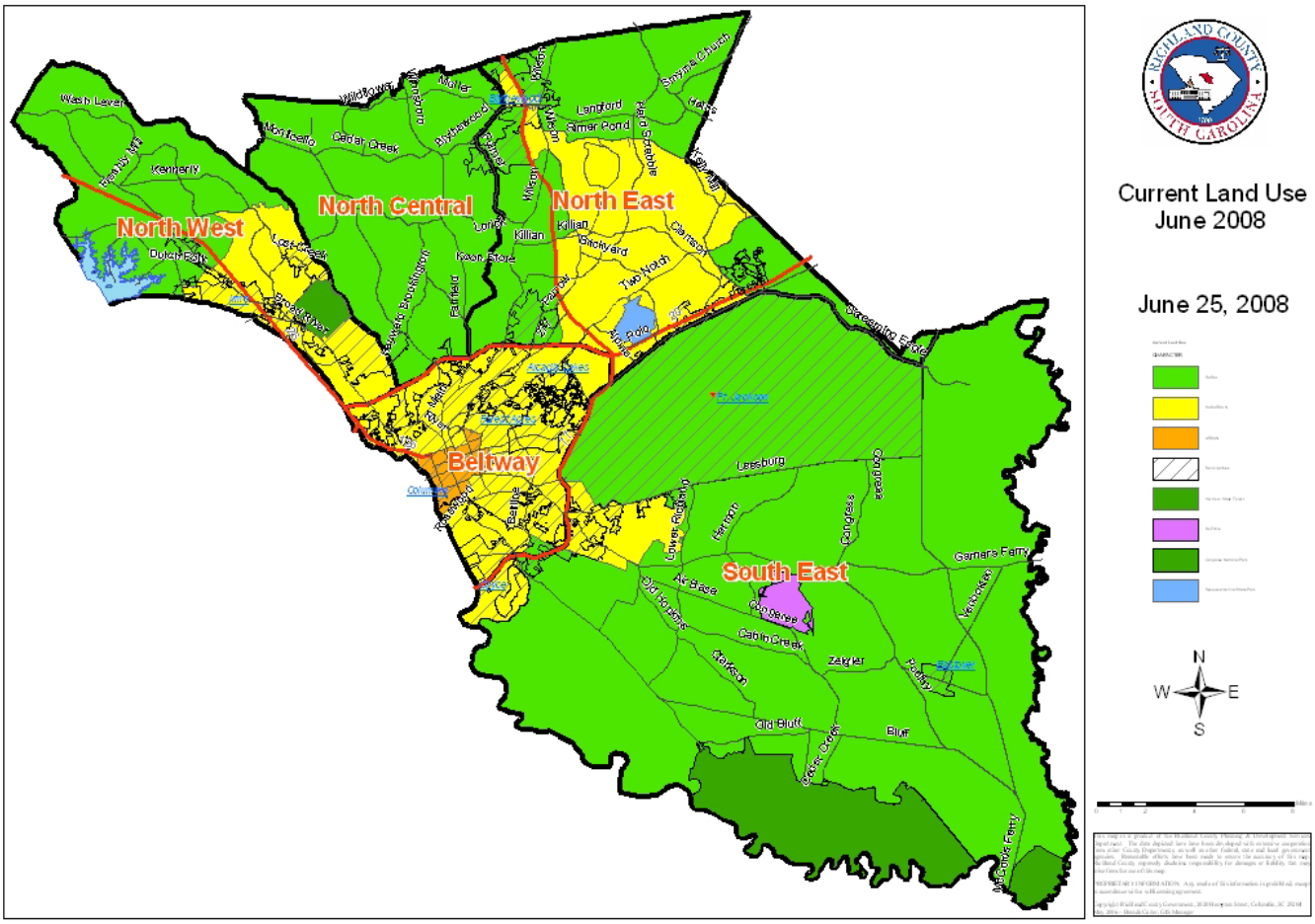

North West
North Central
North East
Beltway
South East
Current Land Use
June 2008
June 25, 2008
N
W
E
S

FIGURE 3

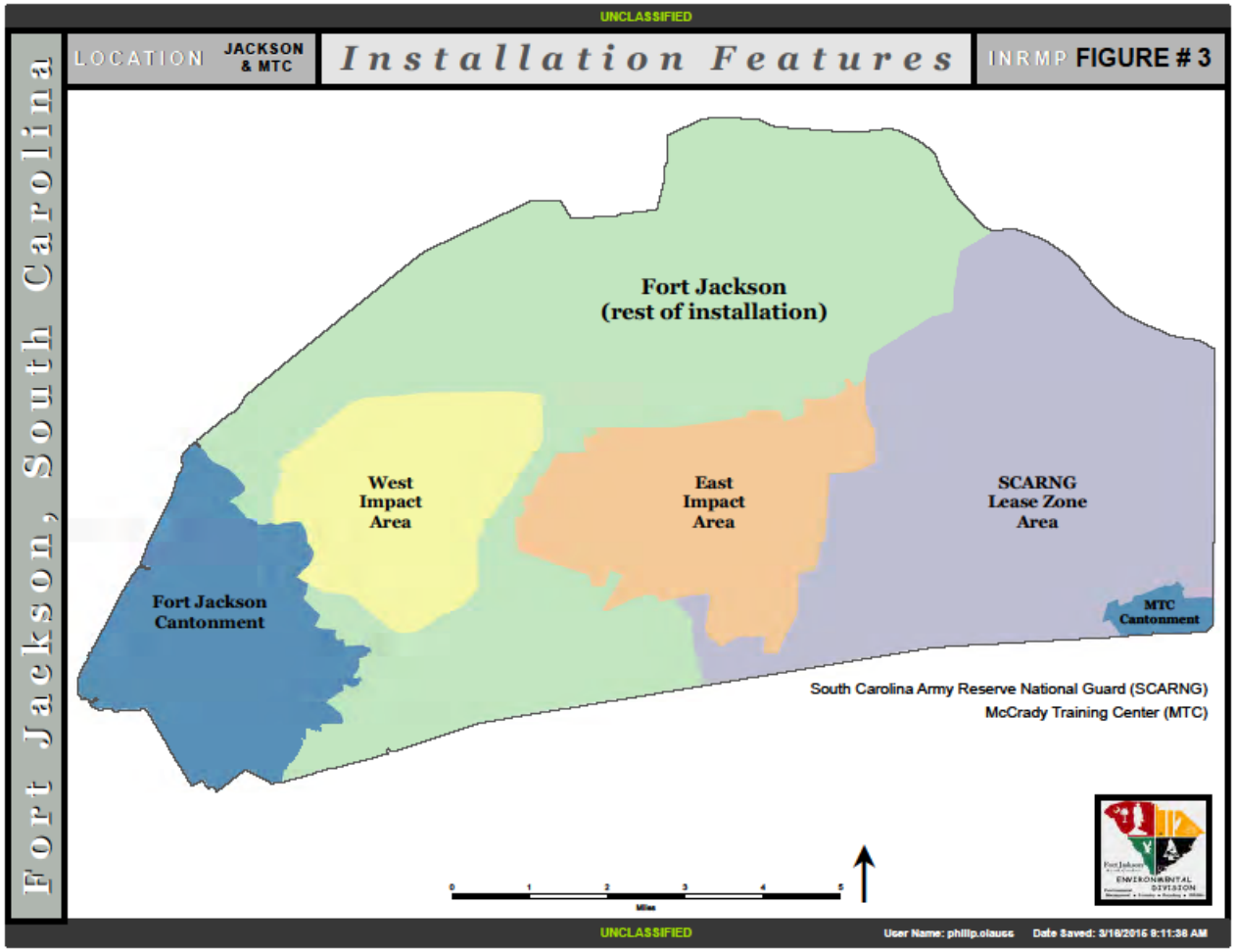

UNCLASSIFIED
Fort Jackson, South Carolina
LOCATION JACKSON & MTC
Installation Features
INRMP FIGURE # 3
Fort Jackson (rest of installation)
West Impact Area
East Impact Area
SCARNG Lease Zone Area
Fort Jackson Cantonment
MTC Cantonment
South Carolina Army Reserve National Guard (SCARNG)
McCrady Training Center (MTC)
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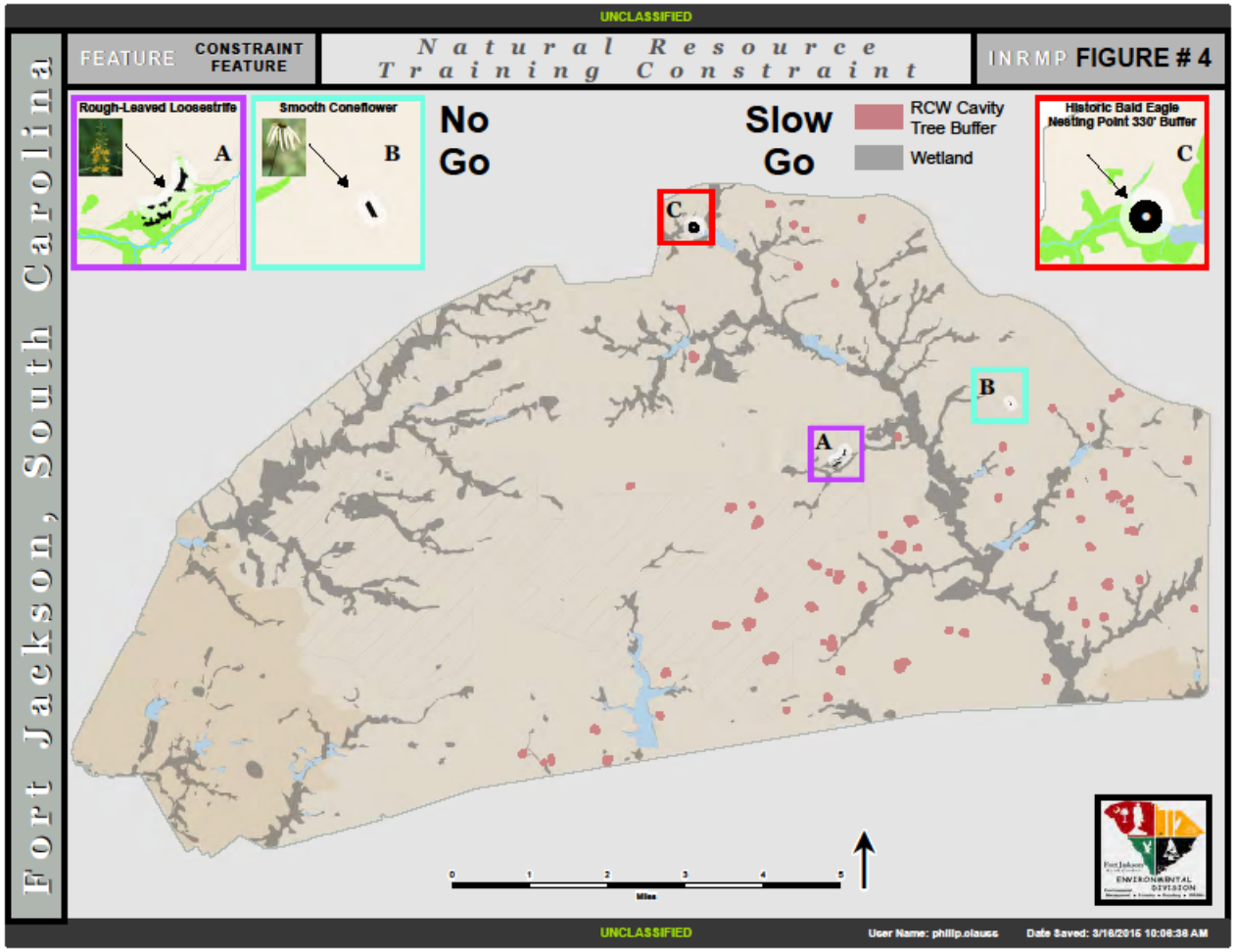
FIGURE 4


UNCLASSIFIED
Fort Jackson, South Carolina
FEATURE CONSTRAINT FEATURE
Natural Resource Training Constraint
INRMP FIGURE # 4
Rough-Leaved Loosestrife
A
Smooth Coneflower
B
No Go
Slow Go
RCW Cavity Tree Buffer
Wetland
Historic Bald Eagle Nesting Point 330' Buffer
C
C
B
A
0 1 2 3 4 5
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ENVIRONMENTAL DIVISION
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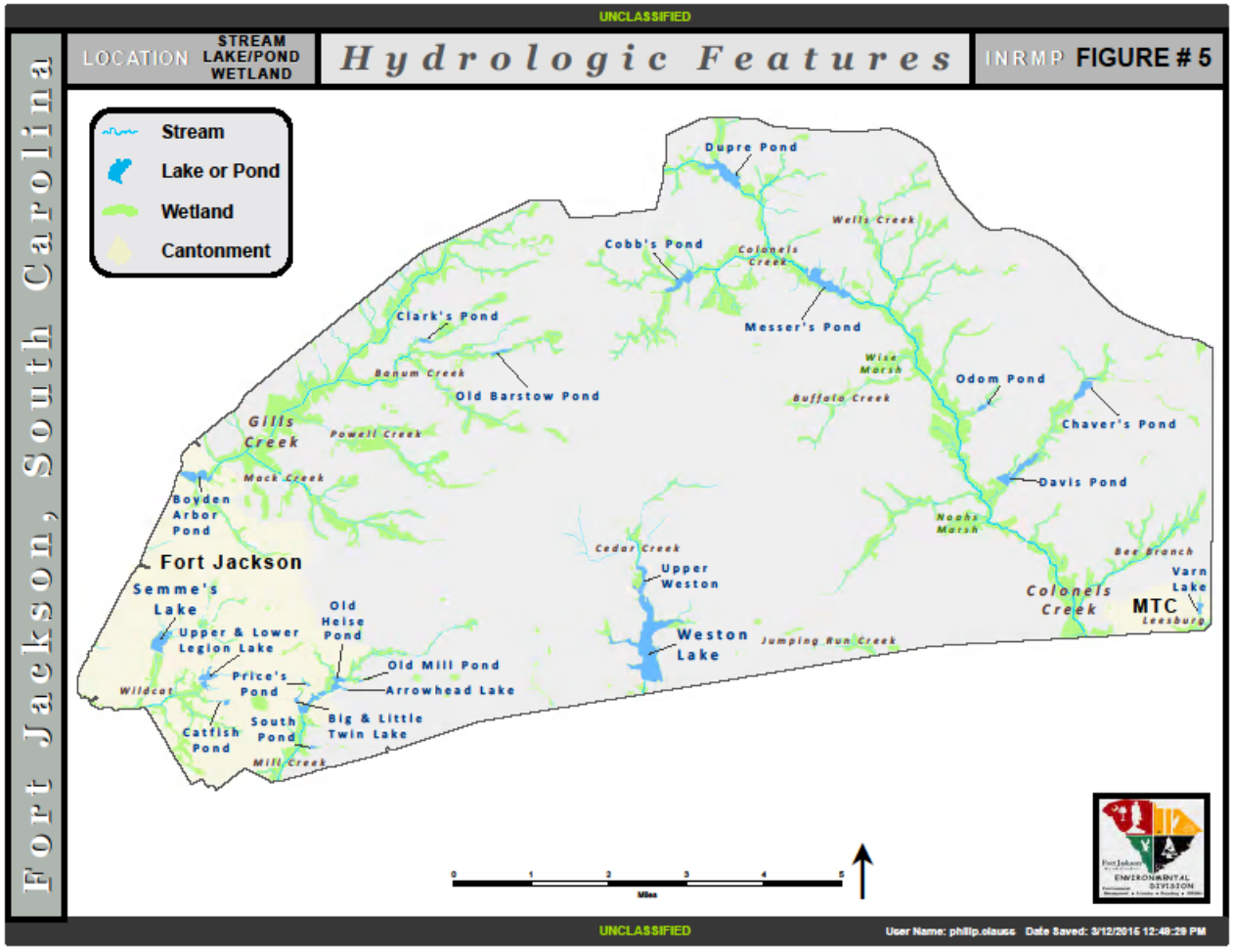
FIGURE 5


UNCLASSIFIED
Fort Jackson, South Carolina
LOCATION STREAM LAKE/POND WETLAND
Hydrologic Features
INRMP FIGURE # 5
Stream
Lake or Pond
Wetland
Cantonment
Dupre Pond
Wells Creek
Cobb's Pond
Colonels Creek
Clark's Pond
Messer's Pond
Wise Marsh
Odom Pond
Banum Creek
Old Barstow Pond
Buffalo Creek
Chaver's Pond
Gills Creek
Powell Creek
Davis Pond
Mack Creek
Boyden Arbor Pond
Naohs Marsh
Cedar Creek
Bee Branch
Fort Jackson
Upper Weston
Varn Lake
Semme's Lake
Colonels Creek
MTC
Leesburg
Old Heise Pond
Upper & Lower Legion Lake
Weston Lake
Jumping Run Creek
Old Mill Pond
Price's Pond
Arrowhead Lake
Wildcat
South Pond
Big & Little Twin Lake
Catfish Pond
Mill Creek
0 1 2 3 4 5
Miles
ENVIRONMENTAL DIVISION
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APPENDIX 1

Acronyms

CX	Categorical Exclusion
DES	Directorate of Emergency Services
DHEC	South Carolina Department of Health and Environmental Control
DFMWR	Directorate of Family, Morale, Welfare and Recreation
DoD	Department of Defense
DPW	Directorate of Public Works
DPTMS	Directorate of Plans, Training, Mobilization and Security
ENV	Environmental Division
EPA	Environmental Protection Agency
ESMC	Endangered Species Management Component
FNSI	Finding of No Significant Impact
FTX	Field Training Exercise
GIS	Geographic Information System
GPS	Global Positioning System
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
IPMP	Integrated Pest Management Plan
ITAM	Integrated Training Area Management
IWAM	Integrated Workplan Analysis Module
IWFMP	Integrated Wildland Fire Management Plan
LCTA	Land Condition Trend Analysis
LEA	Law Enforcement Activity
LRAM	Land Rehabilitation and Maintenance
MOA	Memorandum of Agreement
NRCS	Natural Resources Conservation Service
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
REC	Record of Environmental Consideration
RCW	Red-cockaded Woodpecker
SCARNG	South Carolina Army National Guard
SCDNR	South Carolina Department of Natural Resources
SOP	Standing Operating Procedure
SRA	Sustainable Range Awareness
STX	Situational Training Exercises
TRI	Training Requirements Integration
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
UXO	Unexploded Ordnance

ENDANGERED SPECIES MANAGEMENT COMPONENT FOR THE RED-COCKADED WOODPECKER (*Picoides borealis)*

FORT JACKSON, SOUTH CAROLINA

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ESMC

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Acronyms/Abbreviations

AMTZ	Artillery and mortar target zone
BA	Basal area
BCT	Basic combat training
dbh	Diameter at breast height
DFIRST	Deployable Force on Force Instrumented Range System
DPTMS	Directorate of Plans, Training and Mobilization
DPW	Directorate of Public Works
EIA	East Impact Area
ENV	Environmental Division
ESA	Endangered Species Act
EOD	Explosive Ordnance Detachment
ESMC	Endangered Species Management Component
ESMP	Endangered Species Management Plan
FWS	U.S. Fish and Wildlife Service
FY	Fiscal year
GIS	Geographic Information System
GQFH	Good Quality Foraging Habitat
HMU	Habitat Management Unit
INRMP	Integrated Natural Resources Management Program
IPG	Installation Population Goal
km	Kilometers
LMA	Limited Management Area
MS	Managed Stability
PBG	Potential Breeding Group
RS	Recovery Standard
RCW	Red-cockaded Woodpecker
SCARNG	South Carolina Army National Guard
SCDNR	South Carolina Department of Natural Resources
SDMA	Standard Density Management Area
SPB	Southern pine beetle
UXO	Unexploded ordnance
WIA	West Impact Area

Executive Summary

Current Status: The red-cockaded woodpecker (RCW) is Federally listed as endangered by the U.S. Fish and Wildlife Service. Currently there are 37 active clusters on Fort Jackson. The species is vulnerable to threats on the installation which include small population size and habitat degradation from past land-use management practices. To avoid decline of this population and to remain in compliance with the Endangered Species Act, appropriate management efforts need to be successfully implemented in the next few years.

Habitat Requirements and Limiting Factors: Limiting factors include the small population size, distribution and availability of old growth pine habitat suitable for nesting, and quality foraging habitat.

Management Objectives: The objective of the Endangered Species Management Component (ESMC) is to protect and enhance the RCW population as required by the Endangered Species Act of 1973, as amended (ESA)(U.S. Fish & Wildlife Service 1988), while maintaining training readiness and other mission requirements of Fort Jackson.

Cooperation: The ESMC was developed in cooperation with the U.S. Fish and Wildlife Service (FWS).

Conservation Goals: The area to be managed for the RCW, entitled the Habitat Management Unit (HMU), was established around mission requirements. This area was determined with knowledge of only short-term mission requirements. Changes to Fort Jackson's military mission may require future modification of the HMU. The goal is to provide for and maintain a density of one cluster per 200 acres of suitable habitat (current and potential) in the HMU. Increasing the population and providing adequate quality habitat are essential to conserving this species.

Actions Needed: The major steps needed to reach the objectives and conservation goals are:

1) Identify suitable habitat to be managed for the RCW, set the installation population goal, and identify recruitment clusters.

2) Continue to grow the population (potential breeding groups) through augmentation and translocation efforts at an annual rate of 5% or greater.

3) Implement an effective prescribed burning program to improve habitat.

4) Continue a monitoring program which will include annual inspections of active clusters and provisioned recruitment clusters, at least annual group checks of active clusters and provisioned recruitment clusters, nest checks, banding all RCWs, an assessment every ten years of the quality and quantity of all RCW foraging habitat within the HMU, and a five-year midstory assessment of foraging habitat within the entire HMU. In addition, annual assessments of cluster status and habitat conditions will occur for every active and recruitment cluster.

5) Develop and retain adequate Recovery Standard habitat for each cluster and recruitment cluster, to include sufficient numbers of cavity trees within active clusters and provisioned recruitment clusters.

6) Improve RCW habitat in the HMU through conversion of off-site tree species to on-site pine, control of hardwood midstory, and thinning of forest stands. The guidelines and standards of the 2003 RCW Recovery Plan (Recovery Plan) (U.S. Fish & Wildlife Service 2003) and those of the 2007 Management Guidelines for Red-Cockaded Woodpecker on Army Installations (Guidelines) (U.S. Dept. of the Army 2007) will be adopted as standard management procedures.

1.0 INTRODUCTION

1.1 General

As part of the 5-year review and update of the Integrated Natural Resources Management Plan (INRMP), Fort Jackson revised the 2001 Endangered Species Management Plan (ESMP) for the Red-cockaded Woodpecker (Picoides borealis), and prepared this ESMC. This ESMC, which is specific to the red-cockaded woodpecker, will be incorporated into the INRMP during an upcoming revision, along with the ESMC related to endangered flora species found on Fort Jackson.

The objective of this ESMC is to conserve the RCW as required by the ESA while preserving training readiness and other mission requirements of Fort Jackson. Section 7 of the ESA requires Fort Jackson to carry out a program for the conservation of the RCW. Federal properties are required to employ all methods and procedures necessary to bring the Federally protected RCW to the point at which ESA measures are no longer necessary.

The purposes of this ESMC is to (1) present information on the RCW, an endangered species on Fort Jackson; (2) define conservation goals; and (3) outline a plan for management of the RCW and its habitat that will enable achievement of conservation goals. This ESMC will supplement the Guidelines with detailed measures to meet installation-specific RCW conservation needs and unique military mission needs. The requirements in this ESMC will apply to all activities on the installation.

The specific management goals in this ESMC cover a five-year period. This is generally considered short-term management. Management beyond five years is not specific (except selection of recruitment clusters for additional years) and is considered long-term. Current goals for future years (i.e., Fiscal Years 2013-2017) may be modified if needed. Changes to the ESMC considered significant will require consultation with the U.S. Fish and Wildlife Service (FWS). A new ESMC will not be developed until required by a significant change in Fort Jackson's training mission, management techniques described are generally outdated, or a similar change renders the current ESMC obsolete.

The ESMC attempts to design a HMU which will remain intact for the long-term. The objective is to establish an area where RCW habitat can be maintained indefinitely. This is necessary because long periods are needed to develop the RCW's habitat. Designing such an area with only short-term knowledge of land-use requirements is difficult. The size of the HMU is considered long-term but subject to change due to changing circumstances, changing mission requirements, or new scientific information. Significant changes to the HMU will require consultation with the FWS. Section 8.7 provides more insight regarding this challenge.

Fort Jackson's RCW population has grown from 24 active clusters in breeding season 2000 to 37 active clusters in 2012. This population size is considered relatively small. The active clusters and provisioned recruitment clusters on the installation are shown in Figure 1. RCW management

efforts consistent with the Guidelines and the Recovery Plan will be implemented to increase the number of potential breeding groups on Fort Jackson and to remain in compliance with the ESA.

1.2 Army Guidance Used to Develop the ESMC

The Department of the Army guidance used to develop Fort Jackson's RCW ESMC includes the Guidelines and Army Regulation (AR) 200-1 (U.S. Department of the Army 2007).

1.3 Coordination with Other Agencies and Individuals

The RCW ESMC was developed in cooperation with the FWS and a draft copy of the ESMC was sent to them for comment. Comments on the draft ESMC provided by the FWS are incorporated into the final version of the ESMC.

The FWS has reviewed this ESMC and provided a Biological Opinion which is attached in Appendix E.

2.0 SPECIES INFORMATION

The RCW is endemic to the pine forests of the southeastern United States. Within its range, it is found most commonly in association with longleaf pine (Pinus palustris) forests, although it can be found in other pine habitats, including loblolly (P. taeda), shortleaf (P. echinata), slash (P. elliottii) and others.

RCWs are unique among North American woodpeckers in that they excavate cavities in old living pine trees which are used for roosting and nesting. Minimum age of pine trees selected for cavity trees is about 60-80 years, depending on the species (U. S. Fish & Wildlife Service 2003). The process of excavating a cavity usually takes one to several years to complete (Copeyon 1990).

RCWs exist as socially cooperative breeding groups. These groups normally consist of a breeding pair, helpers (usually male offspring of one or both of the breeding pair from previous years), and the current year's offspring. The helpers assist in excavating new cavities, defending territories, and feeding the young.

RCWs feed mostly on forest insects, but will also eat small fruits and seeds. They forage primarily on the surface of living pine trees within pine dominated forest stands. Good quality foraging habitat contains some large old pines, low densities of small and medium pines, sparse or no hardwood midstory, and a bunchgrass and forb groundcover (U.S. Fish & Wildlife Service 2003).

Developing RCW habitat, especially nesting sites, where none exists today requires a long-term commitment. Pine dominated stands must be grown for extended periods, well beyond the age trees are initially selected for cavity excavation. In cases where potential cavity trees are

present, adequate foraging habitat surrounding these mature trees may be lacking. Providing minimally adequate foraging habitat may require 30 years or more.

The above species information is very general by design. Those wishing to learn more about the RCW can do so by reading the Recovery Plan. A compilation of literature on the RCW (Costa et al. 1996) is available for those interested in more detailed information. Finally, a wealth of information is available in four published proceedings of symposia on the RCW (Thompson 1971, Wood 1983, and Kulhavy et al. 1995, Costa and Daniels 2004).

3.0 TRAINING MISSION

A description of military training is provided in Section 2.1.4 of the INRMP.

4.0 POPULATION GOAL

Fort Jackson used steps detailed in the Guidelines to develop the HMU and resultant long-term population goal, stated as number of active clusters. The resultant HMU and installation population goal (IPG) should "... be considered long-term but is subject to change, through consultation with the FWS, based upon changing circumstances, changing missions, or new scientific information" (U.S. Dept. of the Army 2007). Refinements to the HMU and installation population goal will be an ongoing process. However, the delineated HMU and resultant population goal should be realistic for at least the next five years.

4.1 Summary of Installation Population Goal Determination

The procedure for developing the RCW population goal for Fort Jackson can be summarized in five steps, as follows:

(1) A map of the current and potential RCW habitat for the entire installation was created (Figure 2). This includes areas currently containing pine or pine-hardwood forest or areas where these types of stands can be developed. With few exceptions, developed cantonment area and bottomland hardwood stands, hardwood-pine stands, upland hardwood stands, wildlife openings, swamps, and ponds were not included. Additionally, scrub oak stands within areas containing Unexploded Ordnance (UXO) were not included as potential habitat because of safety-related management limitations. The current and potential RCW habitat for the entire installation is approximately 32,836 acres. This acreage includes mission requirements.

(2) Current and future land uses which are not compatible with management for RCWs including mission requirements and cantonment areas were identified (Figure 3). The West Impact Area (WIA) totaling approximately 4,400 acres is included in the mission requirements. This area has never been part of the HMU because of management and access limitations. Mission requirements total approximately 8,787 acres. Cantonment areas total approximately 6,440 acres.

Next, areas that would allow only limited RCW management [Limited Management Area (LMA)] were identified (Figure 4). The LMA totals approximately 4,404 acres of potential foraging habitat. Management of the LMA is discussed in more detail in Section 7.1.

(3) The current and potential habitat map was overlaid on the mission requirements map. Areas of current and potential RCW habitat outside of mission requirements, including the 4,404 acres in the LMA, were identified as the HMU. Manageable areas too small to support a cluster and non-contiguous (more than 330 feet from) with other manageable areas were deleted from the HMU. Additionally, 2,368 acres in Forest Compartment 1 were removed from the HMU (Figure 5). There are significant wetlands connected with Gills Creek and Bynum Creek in this management compartment. The wetlands serve to fragment and isolate the potential RCW habitat. The remaining habitat exists in long, narrow corridors that are isolated by the creek drainages and the WIA to the south. This type of habitat configuration has proven to negatively affect the colonization and persistence of RCW clusters in other populations (Conner and Rudolph 1991, Conner et al. 2001). The area is also very difficult to manage with prescribed fire. This is because of the proximity to two interstate highways which bound this portion of the property and its proximity to populated urban areas. Due to smoke management concerns and the low probability of persistence of clusters in this landscape configuration, this area will be removed from the HMU. This will allow Fort Jackson to focus scarce management resources on areas with a higher likelihood of success and more potential to contribute to the stability of the population. Of the 2,368 acres in Forest Compartment 1 to be removed from the HMU, approximately 1,224 acres is determined to be potential RCW habitat. Because of the configuration and isolation of the potential RCW habitat, it could support at most 3 long- term recruitment sites.

Delineation of the HMU incorporated several major and a few minor changes since the 2001 ESMP. The first is the removal of the Compartment 1 management area discussed above. In the first step of HMU delineation we identified approximately 32,836 acres of current and potential habitat on Fort Jackson. This is over 9,000 acres less than reported in 2001. There are multiple factors that caused this decrease, including removal of acreage for cantonment expansion, removal of stands in the LMA, removal of 600 acres for the Fort Jackson National Cemetery, removal of openings and stand types that are not considered potentially suitable habitat, and refinements to our geographic information systems (GIS) database. These changes and the associated acreages are detailed in Table 1.

Some other major changes were in the mission requirements and cantonment areas. The larger projects removing HMU acres were evaluated and informal consultation with the FWS was completed. New ranges, Forward Operating Bases, helicopter landing zones, etc. have all been added as mission requirements (Figure 3). Mission requirements total 8,787 acres, approximately 185 acres more than in 2001 (Table 1). However, approximately 1,815 acres of potential habitat associated with an earlier planned DFIRST training area were removed from mission requirements. These 1,815 acres plus the 185 acres mentioned above were added as mission requirements on other parts of the installation (Figure 3). Cantonment areas on Fort Jackson and McCrady Training center continue to expand into lands identified in 2001 as HMU. We foresee additional construction and mission related projects over time expanding the cantonment area. Approximately 1,352 acres are being removed from lands identified in 2001 as HMU for

cantonment area expansion (Figure 3, Table 1). Approximately 62 acres of this was concurred with by the FWS in January 2008 (FWS Log No. 42410-2008-I-0178).

As mentioned above, a 600 acre area of Fort Jackson at the intersection of Percival Road and Wildcat Road was transferred to the Department of Veterans Affairs for the construction of the Fort Jackson National Cemetery. This removal of land from the HMU was concurred with by the FWS in March 2006 (FWS Log No. 2006-I-0408).

About 3,048 acres was removed from the LMA. Removals in the LMA were primarily scrub oak stands and other forest types that cannot be converted to pine due to safety-related management limitations (Approximately 2,213 acres, Table 1). Management of the LMA is discussed in more detail in Section 7.1. Approximately 817 acres were removed from the LMA and designated as mission requirements. Both the scrub oak stands and the mission requirements were previously reported as LMA in error as they do not represent potentially suitable habitat. Finally, improvements in the precision of our land use data, especially GIS data, resulted in better estimates of size, land use, and type. This improvement resulted in changes to both the Mission Requirements and to the amount of current and potential RCW habitat available (Table 1). One example of this is the removal of firebreaks (i.e. unimproved, one-lane roads) from the current and potential habitat.

There is one significant addition of land back into the HMU that should be noted. A large area of training land within the area licensed to the South Carolina Army National Guard (SCARNG) was described in the 2001 ESMP as the DFIRST tracked vehicle training/maneuver site (Figure 3). As stated in the 2001 ESMP, this proposed project had the potential to remove up to 110.5 acres of forest around three short-term recruitment clusters. The total area encompassed 2,098 acres and was designated as mission required. Currently, the SCARNG does not have immediate plans to construct this project. Therefore, all lands associated with this project on Fort Jackson, approximately 1,815 acres of potential habitat, have been added back into the HMU.

After incorporating all the changes, the resulting HMU totals approximately 26,645 acres. The HMU is divided into two areas: the Standard Density Management Area (SDMA) consisting of approximately 22,160 acres and the 4,485 acre LMA (Figure 6).

(4) Relocation of Mission Requirements. While developing the HMU, mission requirements that could be relocated to avoid RCW distribution on the installation were identified. The map of mission requirements was overlaid on habitat within 0.5 mile of active clusters and recruitment clusters. This exercise determined that mission requirements do not currently conflict with RCW cluster habitat. Future mission requirements will be evaluated/reviewed to assess potential impacts as appropriate. Mission requirements that cannot be relocated include archaeological sites (and their buffers) and Resource Conservation and Recovery Act regulated Solid Waste Management Units.

(5) Based on the current and potential habitat in the HMU, Fort Jackson's IPG is 120 active clusters. This is divided between the SDMA (111 clusters) and the LMA (9 clusters). To determine the number of active clusters for the SDMA the current and potential habitat (22,212 acres) was divided by the amount of forage habitat required to support one cluster. At this time we

have site indices for about half of our potential forage stands on Fort Jackson and these are based on old inventory data. For these stands the average site index is 70. This would define the average stand on Fort Jackson as being of moderate to high productivity. Thus, on average, a minimum of 120 acres of good quality foraging habitat should be provided for each cluster (Recovery Plan). However, approximately one-quarter of the stands for which site index has been calculated is less than 60, and would be classified as having low productivity. On sites of low productivity, each cluster should be provided 200-300 acres of good quality foraging habitat (Recovery Plan). Currently, very few stands on Fort Jackson meet all characteristics of good quality foraging habitat. Given the distribution of site indices on Fort Jackson, the incomplete site index data, and the current condition of foraging habitat, we estimate that each cluster on Fort Jackson should be provided with a minimum of 200 acres of foraging habitat. Therefore, the population goal for the SDMA is 111 active clusters. Fort Jackson is in the process of just completed an update to the forest inventory in 2011. Site indices are now being calculated for all potential forage stands within the SDMA. Once site indices are calculated for all potential forage stands, we will perform a spatially explicit analysis using the updated inventory data and GIS to partition all potential habitat. Based on this analysis, we will adjust the population goal for the SDMA as necessary. The LMA currently supports 9 active clusters. Specific management practices cannot be conducted in the LMA, resulting in little to no potential for increasing the number of clusters within. Incidental take is requested for clusters in the LMA. Incidental take in the LMA and management for both the SDMA and the LMA are discussed in Sections 7 and 8.2.

Army Guidelines state that IPGs will be established as the number of potential breeding groups (PBGs) in accordance with population goal definitions of the RCW Recovery Plan. Fort Jackson is categorized in the Recovery Plan as a Significant Support population in the Sandhills Recovery Unit. At that time, the population goal listed in the Recovery Plan was 126 active clusters, based on the Fort Jackson 2001 RCW ESMP. Using criteria established in the Recovery Plan, an estimate of PBGs ranges from about 71-91% of the number of active clusters. Percentages of active clusters with PBGs at Fort Jackson since 1994 have ranged from 54% to 100%, with an average of 80% of active clusters having PBGs (Table 2), about midway in the estimates given in the Recovery Plan. Given these parameters and this revised goal of 120 active clusters, the IPG for Fort Jackson is approximately 96 PBGs.

The lowest number of active clusters and PBGs occurred in 1995 (Table 2). The population began to recover in 1996 and has continued an overall pattern of growth since. Banding of individuals began in fall 1993 and the entire population has been banded since spring 1994. There have been 82 RCWs translocated (inter-population and intra-population) at Fort Jackson from 1994-2011. These have contributed to the growth of Fort Jackson's RCW population.

Projecting the population growth for the next five years is difficult because many factors that affect population growth interact in complex ways (Walters 1990). These factors include survival of adults and young, reproductive success of pairs, number and sex of birds available for translocation to Fort Jackson, success of attempted translocations, and reproductive success of translocated birds. The recommended rate of increase for Army installations is a five percent annual increase in active clusters as described in the Guidelines and the Recovery Plan. The 5-year future population size and ESMC objective, based on 37 active clusters during 2012, for the 2013

– 2017 period with a 5 percent average annual growth (active clusters) rate is 47 active clusters by 2017.

Year	Number of Active Clusters	Percent Growth	Number of Potential Breeding Groups	Percent of Active Clusters with Potential Breeding Group
1994	13	No Data	7	54
1995	10	-23.10	7	70
1996	13	30.00	11	85
1997	14	7.69	12	86
1998	13	-7.14	12	92
1999	17	30.77	15	88
2000	17	0.00	17	100
2001	22	29.41	22	100
2002	25	13.64	25	100
2003	29	16.00	22	76
2004	33	13.79	23	70
2005	33	0.00	20	61
2006	34	3.03	26	76
2007	34	0.00	29	85
2008	35	2.94	23	66
2009	35	0.00	26	68
2010	36	2.86	25	69
2011	36	0.00	31	86
2012	37	2.78	32	86

Table 2: RCW population data from 1994-2012.

There were 17 active clusters in 2000, the first year for which installation population data were reported after approval of the 2001 ESMP. The annual percent growth of active clusters since 2000 has varied from a high of 29.4 percent (2000 – 2001) to a low of 0.00 percent (multiple years) (Table 2). The average annual percent geometric growth rate for this period was 6.7 percent. Average annual percent geometric growth for the last 5-year period was 1.71 percent. This is well below the recommended annual growth rate. We are currently evaluating the spatial distribution of existing RCW clusters and the associated habitat quality to determine if poor spatial distribution and/or habitat quality are affecting the growth rate of the population.

Population and nesting parameters on Fort Jackson are within expected ranges for many variables but not for others (Table 3). For several years, Fort Jackson has had a high proportion of solitary male clusters. In some cases this appears to be due to isolation of the clusters in question and in some cases it may be a function of habitat quality. One to several clusters each year are captured by adjacent PBGs. These are typically in areas that do not have enough forage to support two groups because of the proximity to the property boundary or because of the lack of sufficient foraging habitat due to young pines. The percent of PBGs not nesting has averaged 11% over the past several years which is comparable to that reported for other populations (Conner et al. 2001). An exception to this was in 2007 when nearly 21% did not nest. Clutch size is comparable to that reported for other populations. However, eggs that fledge per successful nest, young fledged per successful nest, and young fledged per PBG are slightly lower than those reported for the nearest populations (Conner et al. 2001). This discrepancy may be due to variation in territory quality on

Fort Jackson, with high quality territories successfully producing young at an expected rate and lower quality territories experiencing higher rates of failure and lower fledge success. Additionally, Fort Jackson appears to have a high breeder turnover with a larger proportion of young breeders [average male retention between 2007 and 2011 71% (54-81%), average female retention 62% (53-72%) and median age of female breeders is 2 for all years between 2007 and 2011].

Year	Solitary	% Solitary	% PBGS not Nesting	Nest Failure Rate	Clutch Size	Eggs that fledge/ Succesful Nest	Young Fledged/ Successful Nest	Young Fledged per PBG
2007	5	14.7	20.7	26.1	3.44	53.3	1.70	1.00
2008	9	25.7	4.3	18.2	3.33	60.6	2.06	1.61
2009	8	21.1	7.7	41.7	3.22	58.9	1.93	1.04
2010	9	25.0	12.0	18.2	3.12	67.1	2.17	1.56
2011	3	8.3	12.9	7.4	3.26	56.3	1.80	1.45
2012	5	13.5	9.4	17.2	3.06	61.5	2.0	1.5
AVE		18.05	11.16	21.47	3.24	59.62	1.94	1.36

Table 3: RCW population and nesting parameters 2007-2012.

Significant efforts to improve cluster condition and foraging habitat condition have been undertaken over the past several years. Chief among these is the provisioning of sufficient suitable cavities for all clusters. One-hundred and twelve inserts have been replaced and 113 new inserts have been installed since 2008. It is likely that cavity limitation was at least one factor influencing recent population trends. Approximately 1,600 acres have been treated mechanically or chemically to remove hardwood midstory over the past 5 years. This has improved habitat structure within clusters and associated foraging partitions. In 2011 there was a significant increase in the number of PBGs (+24%) and a significant decrease in percentage of clusters with solitary males (Table 2). It is likely that efforts to improve quality of existing clusters are at least in part responsible for this increase.

Efforts to promote population expansion and understand limiting factors on Fort Jackson will continue. First, strategic recruitment planning will be used to ensure that recruitment clusters are placed in areas that have sufficient foraging habitat. Recruitment planning is discussed in more detail in Section 5.2 and Appendix D. Second, a new forest inventory was completed in 2011. The data from this inventory were used to determine habitat availability and condition and to guide management decisions. A detailed plan to address habitat issues within existing foraging partitions was developed and is included in Appendix F. Habitat management practices are discussed in more detail in Section 5.1 and Appendix F.

We estimate that the long-term goal of 120 active clusters should be reached between 2065 and 2075. All of the existing onsite pine and many of the stands which have been converted and will be converted in the future will be suitable nesting habitat by this time. The remainder of the HMU should be suitable for foraging.

5.0 MANAGEMENT GUIDELINES AND PRESCRIPTIONS

Management procedures detailed in the Guidelines and in the Recovery Plan were used as a basis for the methods described in this section. Areas requiring other changes or limitations to the methods described in this section are discussed in Section 7.0 and 8.0.

5.1 General HMU Management Practices

The long-term goal for habitat management within the RCW HMU is to provide optimum foraging and nesting habitat that is contiguous with, and as close as possible to each cluster. All habitat management practices in the HMU will be developed and implemented for the purpose of establishing Good Quality Foraging Habitat (GQFH) as specified in the Recovery Plan. Currently most of Fort Jackson's RCW HMU does not meet these guidelines and will need significant restoration to meet these goals. Some of the major deficiencies are related to the age of the forest, the density of small pines, and hardwood midstory. These issues will be addressed first in existing clusters then throughout the RCW HMU. A detailed 5-year plan for habitat restoration on Fort Jackson is presented in Appendix G. Within the LMA, management activities are limited to prescribed fire and cavity maintenance. Therefore, we may not be able to establish GQFH throughout the LMA. Habitat management practices within the LMA are discussed in Section 7.1.

The HMU will encompass all clusters, areas designated for recruitment, and adequate foraging areas. Clusters that have been documented as continuously inactive for a period of five consecutive years or more may be deleted from RCW management requirements. Designated recruitment clusters that have not been occupied for a period of five consecutive years may also be deleted from the HMU. Fort Jackson will determine availability of and manage for foraging habitat and clusters in accordance with guidelines established in Section 8.I. and elsewhere in the Recovery Plan, i.e., the recovery standard (RS). All previous standards, guidelines, and practices in the 2001 ESMP based on the 1985 RCW Recovery Plan and FWS Blue Book are no longer applicable.

Due to RCW biological needs, clusters and the surrounding cluster stand require a more intense level of management than other areas within the HMU. Within the HMU, maintenance priority will be given to active clusters over both inactive and recruitment clusters. Fort Jackson will manage habitat within active and recruitment clusters in accordance with guidelines established in the Recovery Plan and the Guidelines. Cluster management will include the protection and retention of old pines for cavities, maintenance of sufficient suitable cavities, and restoration and maintenance of suitable habitat structure and quality within the cluster (minimum of 10 acres).

A minimum of four suitable cavities, or at least the number of cavities equal to the number of birds that remain after all young have fledged will be maintained in all active clusters. A minimum of four suitable cavities will be maintained in all recruitment clusters. Active clusters and recruitment clusters will be kept clear of dense midstory. An open, park like pine stand of at least 10 acres in size will be maintained. All hardwood midstory within 50 feet of cavity trees will be removed. Selected hardwoods beyond 50 feet may be retained to benefit species other than the

RCW. All foraging stands should consist of no or sparse hardwood maintained below 7 feet in height. Canopy hardwoods will be limited to no more than 10 square feet (ft^2) of basal area (BA). Pines which are large enough to provide foraging habitat or large/old enough for cavity trees within 50 feet of an existing cavity tree will only be removed if deemed necessary by a Fort Jackson RCW biologist.

Across the installation there are relict cavity trees that are no longer suitable for management. Examples include relict trees containing cavities that are no longer suitable in managed habitat and relict trees located in areas that will not be managed as RCW habitat (e.g., upland or bottomland hardwood areas, mission required areas). Multiple conditions render cavities unsuitable. Most commonly these cavities have greatly enlarged entrances or a rotted base and are no longer acceptable for use by RCWs. Protective buffers around relict cavity trees may be removed if they are deemed un-manageable, however the trees will remain on the landscape and will not be cut. Natural resources personnel trained in RCW management will determine those cavity trees for which suitable cavities can no longer be maintained or provided.

While other areas within the HMU do not require the same level of intense management as clusters and recruitment clusters, the quality of foraging stands should be maintained by a prescribed burning program sufficient to control hardwood growth, eliminate dense midstory, and reduce fuel levels available to wildfires. Prescribed burning is normally the most effective means of midstory control and is recommended as the best means of maintaining a healthy ecosystem. However, current habitat conditions on many areas of the HMU will require other restoration techniques in order to establish minimally suitable habitat. Once habitat conditions have improved, prescribed fire will be used to maintain and improve the habitat with the goal of reaching GQFH as described in the Recovery Plan. A detailed habitat analysis and 5-year habitat restoration plan is presented in Appendix G.

Prescribed burning will be conducted at least every three years in suitable longleaf, loblolly, slash, and shortleaf pine stands. The age of the stand when fire will be introduced will depend on the species of pine and site conditions. Burning will be conducted by qualified personnel, in accordance with applicable Federal, State, and local air quality laws and regulations. Burn prescriptions will be prepared for each burn unit based on habitat evaluations for each individual RCW group. The prescriptions will include parameters necessary to reach the burn objective and will include at a minimum; season of burn, fuel moisture, wind speed, relative humidity, and acceptable drought indices. Burning will normally be conducted in the growing season since the full benefits of fire are not achieved from non-growing season burns. Non-growing season burns will be used to reduce high fuel loads before growing season burns are conducted. Fire plows will be used in clusters only during emergency situations. Aerial ignition will be used for prescribed burning when feasible. Cavity trees will be protected from fire damage during prescribed burning as described below.

Measures to minimize the damage of RCW nesting and foraging habitat associated with the application of prescribed fire will include at a minimum the following:

(1) Protect individual cavity trees by reducing fuel loads at the base of the tree by raking, mowing, and wetting cavity tree as needed.

(2) Reduce high fuel loads utilizing dormant season fires before application of growing season fires.
(3) Adequately monitor cavity trees and foraging habitat post-fire to identify unusual stress or mortality of pines.
(4) Provision cavity inserts within 48 hours to replace cavities lost in the fire.

Alternatives to prescribed burning for hardwood midstory control, control of dense pine natural regeneration, and habitat restoration include the following:

(1) Mechanical Mowers- These will be either tractor-drawn mowers or tracked or rubber-tired cutters with front or rear mounted rotary drum severe duty flail cutter heads or fixed tooth mulching/cutter heads.
(2) Manual - Hand operated chainsaws and gas-powered line trimmers with saw blades.
(3) Chemical - Registered herbicides applied by broadcast and single stem techniques.

These methods will be used when prescribed burning is not feasible, is insufficient to control a well advanced hardwood midstory, and in combination with prescribed burning. All three alternatives above may be used in both nesting and foraging habitat. Application of herbicides will be consistent with applicable Federal, State, and local laws and regulations. A detailed 5-year plan for habitat restoration is included in Appendix F.

Timber harvesting and habitat maintenance activities, with the exception of prescribed burning activities and emergency construction of artificial cavities, will not be conducted in active clusters during the nesting season, occurring from 1 April through 31 July. If a biologist experienced in RCW management practices determines that habitat maintenance activities are not likely to adversely affect nesting activities, they may be conducted after coordination with FWS.

RCW conservation has been included in Fort Jackson's Integrated Training Area Management program. Close coordination between the Directorate of Plans, Training, Mobilization and Security (DPTMS) and Directorate of Public Works (DPW) ensures that field training does not adversely affect the RCW. Through a program conducted by the DPW, a member of each military unit (usually at the company level) is educated about a wide variety of environmental subjects, including conservation of endangered species. This unit member, called the Environmental Compliance Officer, is charged with educating other members of the unit. Specific civilian employees are also educated through this program. In addition, GIS is used to record natural resource baseline information required for management of the installation's training land. The GIS database is used in the development of RCW conservation programs.

5.2 Recruitment Cluster Selection

The recommended number of recruitment clusters to achieve population growth rates of 5-10 % per year is a constant supply equal to 10 % of total active clusters in the population (Recovery Plan). Based on this recommendation and a minimally desired average annual growth of 5 % per year, Fort Jackson will annually provide recruitment clusters to equal at least 10 % of the total

number of active clusters. A total of 21 recruitment clusters will be required during 2013-2017 period based on 5% growth. Currently there are 12 suitable recruitment clusters on the landscape, so an additional 9 clusters may be provisioned by 2017. Per FWS guidelines, recruitment clusters will not be established at a rate higher than can reasonably be occupied within 1 to 3 years, except when those recruitment clusters are established in areas that are somewhat removed from existing groups. Priorities for the selection and management of recruitment clusters are presented in Appendix D.

5.3 Timber Harvesting and Management in the HMU

The goal of timber management on Fort Jackson is to maintain and increase the quality and quantity of RCW habitat. All silvicultural treatments in the RCW HMU will be developed and implemented for the purpose of establishing GQFH as specified in the Recovery Plan. The Guidelines direct installations to follow the guidelines presented in Sections 8.I and 8.J of the Recovery Plan. In accordance with these guidelines, silvicultural practices will utilize ecosystem management to produce GQFH throughout the RCW HMU. All habitat within the HMU will be managed with the long term goal of meeting all of the RS criteria for GQFH.

Due to historical land-use practices, much of the forest on Fort Jackson is not currently suitable RCW habitat (Figure 7). First, the existing pine and pine-hardwood stands on Fort Jackson are young. Approximately 5,700 acres of the SDMA are aged less than 30 years and are too young to be considered forage. Almost 10,000 acres are between 30 and 59 years and may be considered forage but may not contain trees suitable for cavities. Only a little over 5,000 acres are aged at 60 or over. Stands greater than 80 years old cover only about 1,100 acres and there are only 10 stands aged over 100 covering only 249 acres. Contributing to the young age structure of the forest is that over 6,000 acres have been converted from off-site slash pine to longleaf pine and these stands have not reached minimum forage age. Small patches of old longleaf pine do exist in many of the younger stands. Most of these patches were evaluated in the development of a long term recruitment plan and considered for future recruitment clusters.

The second factor contributing to the lack of suitable habitat on Fort Jackson is that many of the stands in the SDMA have not been thinned in the past and contain high BA of small pines. The primary goal of timber thinning on Fort Jackson is to increase the amount of suitable foraging habitat in the RCW HMU, with priority placed on stands within active foraging partitions. A detailed analysis of forest stands and a 5-year improvement plan is included in Appendix F.

In addition to having a lot of young and/or high BA stands, many older stands outside of the EIA, that would otherwise be suitable, experienced a period of fire exclusion. The lack of fire in these stands has often resulted in a high and dense hardwood midstory, rendering these stands unsuitable for both cluster and foraging habitat. While fire has been reintroduced to many areas across Fort Jackson, prescriptive application of fire will have to continue in order to make these stands suitable for RCW occupation. Additionally, many stands require chemical or mechanical restoration before fire will be sufficient to improve stand quality. A preliminary analysis using our latest forest inventory and the RCW Matrix tool indicated that more than half of our HMU did not

meet Managed Stability (MS) guidelines for hardwood midstory. Appendix F includes a detailed analysis of stand condition and restoration efforts planned for the next 5 years.

Recent management practices have increased the quality and quantity of habitat for the RCW. A continued aggressive program of habitat improvement will further increase the quality and quantity of forage habitat and develop the necessary habitat structure to support the IPG. The following practices will be implemented or continued:

(1) Thinning will be conducted in existing pine and pine-hardwood stands to maintain stand vigor and proper BA for RCW cluster and foraging habitat in occupied and unoccupied habitat for future recruitment.

(2) Off-site pines (slash & loblolly) in the HMU will be converted to longleaf pine. A 5- year plan addressing the conversion of these sites is included in Appendix G.

(3) Scrub oak stands found outside of the LMA will be converted to the pine species which historically grew on-site. Longleaf sites will receive priority. The majority of the conversion has already taken place. A 5-year plan addressing the restoration of these stands is included in Appendix G.

(4) As noted previously, growing season burning and herbicide applications will be conducted in suitable stands.

Silvicultural treatments in the next 5 years will be focused on thinning and conversion of off-site species and scrub oak stands to longleaf pine. We do not anticipate regenerating on-site pine and pine hardwood stands. Forest management will be consistent with the conservation and restoration of RCW habitat throughout the RCW HMU.

5.3.1. Thinning

As stated above, much of the HMU is currently unsuitable due to high BA of small pines. Thinning operations planned for the next 5 years will be directed at reducing BA of small pines in overstocked stands, especially those that are in half-mile foraging partitions for active and recruitment clusters. Areas were prioritized based on the greatest need in order to bring foraging partitions up to at least 75 acres of minimally suitable foraging habitat. However, implementation of the thinning plan will include other stands that are in the target or adjacent management unit. All thinning is targeted at either rendering the stand suitable under MS guidelines, or moving the stand toward GQFH. The overall goal is to bring all foraging partitions up to the standard for MS in the short term and to GQFH in the long term. A detailed analysis of stand condition and 5-year treatment plan is included in Appendix F.

Thinnings are designed to establish suitable RCW habitat in overstocked unsuitable stands and keep favorable trees growing by removing less favorable neighboring trees. Competition from neighboring trees causes reduced tree vigor, making individuals more susceptible to death from drought, insects, and disease (Oliver and Larson 1990, as cited by U.S. Forest Service 1993).

Preferentially leaving trees important to RCWs during thinning and harvests greatly benefits the species and the ecosystem. Important trees to leave include old and very old pines (relict and remnant pines and flat tops), potential cavity tress (pines over 60 years in age), and pines scarred by turpentine harvest or lightning. The pine species which is best adapted to a particular site will be favored when thinning stands. Healthy relicts will be left standing indefinitely. Other than the priorities listed above, leave trees will include the healthiest, best formed, dominant and co-dominant trees well distributed and spaced. Trees which are diseased, suppressed, and have poor vigor will be removed unless needed to maintain the main canopy. Generally, thinning will result in the development of well stocked stands which consist of well formed, healthy trees, while maintaining relicts for potential cavity trees. Continued thinning over time should reduce the risk of southern pine beetle (SPB) infestation.

The target BA of pine within the RCW HMU is 40 to 80 ft^2 per acre following the guidelines for GQFH when possible. In stands where sufficient old and large pines are not available to produce the structure for GQFH, the standard for MS will be followed. For more information on these Guidelines please see the Recovery Plan or the Guidelines.

The order of priority for thinning stands will be determined by the Biologist and the Forester based on active clusters, forage for active clusters, recruitment clusters, forage for recruitment clusters, and other stands within the HMU. Stands to be thinned will be grouped into specific sale areas and the sale areas will be prioritized. This may sometimes result in lower priority stands being thinned before higher priority stands because they are in the current sale area. However, higher priority stands within a sale area will almost always be thinned before the lower priority stands. In addition, because we have a limited ability to sell metal contaminated timber, lower priority thinning may have to take place before the higher priorities are completed. This would occur if much of the higher priority thinning require removal of metal contaminated timber. A 5-year timber thin plan is included in Appendix F.

5.3.2. Restoration

Restoration involves the re-establishment of the pine species adapted to a particular site after the off-site pine or scrub oak has been removed. Historically, the most commonly replaced pine species was longleaf because of its relatively slow growth and problems with its regeneration. The tree species to be restored on each site will depend on site conditions. The majority of restoration areas are best suited for longleaf pine, including some sites currently supporting loblolly pine (which is considered off-site). Those few areas in slash pine or scrub oak which are adjacent to wetlands with a correspondingly high site index will be converted to loblolly pine. There are a few slash stands which appear to be healthy and growing vigorously. These few slash stands will be managed until the stand can no longer maintain itself, or until the decision is made to convert the stand to an on-site pine species. Fort Jackson's priority is to convert appropriate sites to longleaf pine. Details on restoration are included in Appendix G.

Generally, 30-40 ft^2 of BA per acre of evenly distributed longleaf pine must be present to re-establish this species via natural regeneration (seeding). Some stands with off-site pine and

inadequate residual longleaf pine stocking for natural longleaf regeneration will be converted by removing merchantable and un-merchantable off-site pine in one cutting, preparing the site (prescribe burning, chemical and/or mechanical methods to include drum-chopping), and planting longleaf pine. Islands of longleaf pine within the conversion site containing 30 ft^2 of BA per acre or more will be retained. Rarely a stand will need to be retained in order to provide foraging habitat for an existing RCW cluster, or to maintain habitat contiguity for future recruitment clusters while adjacent longleaf plantations reach the necessary size and age for suitable forage. Some of these stands may be thinned to 40 ft^2 BA per acre and underplanted with longleaf pine. The remaining off-site pine will be removed once the longleaf reach the appropriate age and/or size to maintain habitat contiguity. Specific restoration timelines and prescriptions for these stands are provided in Appendix G.

Existing longleaf pine regeneration within a restoration site will be conserved by requiring timber harvesting contractors to 1) avoid seedling/sapling concentrations over 1/2 acre, and 2) requesting they avoid those areas between 1/4 and 1/2 acre. Conserving all longleaf pine natural regeneration within the harvest area is impractical during conversions. This is due to damage caused by equipment during harvest and site preparation.

Within conversion areas all healthy longleaf will be marked and retained unless the BA is greater than 40 ft^2 per acre. In areas of higher BA, the longleaf patches will be thinned to meet RCW foraging habitat guidelines.

In many instances, restoration sites contain small upland hardwood inclusions. Examples of species present include southern red oak (Quercus falcata), red oak (Q. rubra), mockernut hickory (Carya tomentosa), and pignut hickory (C. glabra). Generally, these small inclusions will be protected and not harvested during site conversions. Stands which historically supported hardwood stands (including mixed stands dominated by quality upland hardwoods), both in upland and bottomland areas, will not be converted to pines unless a biologist determines this is needed to support a RCW cluster or recruitment cluster. These hardwood stands are not being considered part of the HMU and continuing to manage them as hardwoods will not change the RCW population goal mentioned above.

5.3.3. Forest Pest and Disease Management

Trees within the HMU, excluding off-limits areas (ex. UXO areas), affected by pine beetles (e.g., Ips and/or SPB) infestation or infectious tree diseases (leptographium sp.) will be evaluated for treatment. Treatments for beetles may include the use of pheromones, cutting and leaving, or cutting and removing infected trees. The installation forester will determine the appropriate treatment for each site infected with pine beetles. The forester will consult with an RCW biologist to determine the appropriate treatment, when those sites occur within the RCW HMU. Pines will be left standing around active clusters whenever forage is limited and the infestation is not expected to spread. The expertise of the U.S. Forest Service, the South Carolina Forestry Commission, or other disease specialists/entomologists will be sought for control of diseases or pests, including pine beetles, when needed. A buffer of uninfected trees may be removed if deemed necessary to stem the spread of the infectious agents/pests. Cavity trees will be cut only

with the approval of the FWS. Similarly, RCW foraging habitat analysis will be conducted prior to cutting treatments that remove 10" diameter at breast height (dbh) or greater pine in active clusters and foraging partitions, and also approved by the FWS. Prior to cutting an infected cavity tree, a suitable replacement cavity tree will be identified and provisioned.

5.3.4. Forest Management of Metal Contaminated Stands

Tree contamination with bullets and shrapnel has occurred since soldiers began firing munitions at Fort Jackson. Most of the installation has been a weapons range at some time in the past 60 years. The current location, level, and type of metal contamination have not been precisely defined. Metal contamination affects silvicultural management by limiting the commercial value of the timber resource. Timber buyers are reluctant to bid on areas which have metal contamination. For the timber buyer to bid on metal contaminated timber the contamination cannot contain any shrapnel or steel jacketed bullets, such as .50 caliber bullets. It is possible to sell metal contaminated stands, including those with steel jacketed bullets or shrapnel, which contain trees that are appropriate for use as telephone poles and/or pilings. Stands containing metal contamination may have no commercial value, depending on the level or type of metal contamination. Stands with commercial value will continue to be actively managed.

Most of the stands that are judged to have no commercial value are generally at least 50 years old. This represents the time period when ranges ceased firing outside of the two current impact areas. Alternatives for managing these type stands include removal of stems by paying a contractor to cut and remove, or selective herbicide injection.

Should management of metal contaminated stands prove to be impractical, these stands may be removed from the HMU and the population goal changed accordingly. Consultation with the FWS will be initiated before the population goal is adjusted.

5.4 Pine Straw Harvesting within the HMU

During the next five years, Fort Jackson will suspend the commercial harvest of pine straw within the HMU.

5.5 Restoration and Construction of Cavities

5.5.1. Restoration of Cavities

Entrances of active and inactive RCW cavities (including starts), both naturally and artificially constructed; found to be in poor condition during annual inspections will be repaired whenever feasible to prolong cavity use. Cavity restrictors may be installed on enlarged RCW cavity entrance holes (greater than two inches in diameter) to optimize the availability of suitable cavities. Restrictors may also be installed to protect RCW cavity entrances that have not been

enlarged where suitable cavities are limited, the threat of enlargement is great, or when another species that can be excluded by the use of a restrictor is using a cavity. Priorities for the installation of restrictors in descending order will be: active single tree clusters, single bird clusters, clusters with less than four suitable cavities, and other clusters. Restrictors will not be placed on the entrances of cavities no longer being managed.

Techniques for installation of restrictors will be based on Carter et al. (1989). An opening size of 1.75 inches (44 mm) will be used normally. Reaction of RCWs to restrictors will be monitored when they are placed on the entrance of active cavities. Monitoring will be conducted the same day a restrictor is placed around the entrance of an active cavity. If avian competitors larger than the RCW continue to use the cavities, restrictors with 1.5 inch (38 mm) openings will be used and closely monitored. Adjustments to the positioning of the restrictors will be made to ensure competitors are excluded and RCW access is unencumbered.

Additional measures to maintain the suitability of a cavity will be used on inactive cavity trees if these are deemed likely to benefit the RCW. For example, in those few instances when a usable cavity has two entrances and one has been enlarged beyond repair, the enlarged entrance will be closed via a metal plate covered with wood filler. The effect of these measures on the RCW will be monitored if the tree is re-activated.

5.5.2. Construction of Cavities

Artificial cavities will be constructed in areas designated for recruitment or translocation and in clusters where the number of suitable cavities is limiting. The objective is to provide at least four suitable cavities per active or recruitment cluster. Priorities for installation of artificial cavities in descending order will be: active clusters with a single cavity tree, active clusters with insufficient cavities to support a potential breeding group, and recruitment clusters in the order specified in Section 5.2 and Appendix D. In all active clusters and recruitment clusters, a minimum of four suitable cavities will be maintained. In instances where group size is greater than four, additional cavities may be provided to ensure that all adults in the cluster have access to a cavity.

Cavity construction will follow guidelines presented in Section 8.E. of the Recovery Plan. Cavities will be provisioned by either drilling or insert techniques and accomplished by fully trained personnel. The Copeyon-drilled method will be used for drilled cavities (Copeyon 1990) and Allen's (1991) technique will be used to install inserts. Details describing drilling and insert techniques are found in the Recovery Plan.

Inserts, or restrictors used to protect them, may be modified to prevent competitors from destroying or modifying the cavities or their entrances. Examples of such actions include:

(1) Gluing a piece of PVC pipe in the entrance of inserts (Richardson and Bradford 1996/1997).

(2) Modify the full-face plate restrictor to cover beyond the edges of the insert instead of just the front, or use expanded metal to cover beyond the edges of the insert. The sides of the restrictor or expanded metal would be nailed to the tree. Red-bellied Woodpeckers and Pileated Woodpeckers sometimes create holes in inserts from the side of the box, where the tree and the side of the box meet. A restrictor or expanded metal enlarged to cover this gap would prevent this from happening. The restrictors will be adjusted to make them small enough to permit face plate construction by the RCW but large enough to prevent other species from entering inserts from the side.

Fort Jackson will consult with the FWS for approval for any modification to drilled cavities or inserts beyond those discussed in the Recovery Plan.

5.6 Measures to Reduce RCW Predation and Competition for RCW Cavities

In small RCW populations, it is important to use appropriate management techniques to ensure that predation of adults and offspring, including eggs, is minimized. Techniques which reduce competition for cavities will also provide greater potential for population expansion. However, Recovery Plan guidelines state that methods of predator control should be used only in populations of less than 30 PBGs. Further, it is stated that control methods should be non-lethal if possible. Squirrel excluder devices and snake excluder devices have both been used at Fort Jackson with varying rates of success. These management tools will no longer be used on Fort Jackson since the population has exceeded 30 PBGs.

Where possible, the retention and protection of snags will be used to minimize competition for RCW cavities. Occasionally snags present a hazard when adjacent to firebreaks or roads and may be removed. Nest boxes may be used on Fort Jackson in or adjacent to active clusters and provisioned recruitment clusters in an attempt to reduce competition for RCW cavities. Other techniques designed to reduce competition for cavities or predation on the RCW may be used. Appropriate monitoring will be performed to ensure these do not adversely affect the RCW. Consultation with the FWS is required prior to their use.

5.7 Protection of Clusters

5.7.1. Markings

In order to protect clusters and individual cavity trees, they must be made easily recognizable by all personnel (Soldiers, natural resources personnel, timber harvesters, mid-story removal contractors, hunters, etc.) using the area. Therefore, all protected cavity trees on Fort Jackson (including those with starts) in active and recruitment clusters, regardless of location, will be marked with two white bands no more than approximately four inches wide and eight inches apart. The bands will be centered approximately four to six feet from the base of the tree. A uniquely numbered small metal tag will be affixed to the cavity tree for identification purposes.

There are many inactive relict cavity trees scattered across the landscape on Fort Jackson. These trees will be marked as described in the preceding paragraph except light green paint will be used instead of white. This identifies the trees to all personnel using the area as historically used RCW cavity trees that are not to be damaged in any way. It also shows that these trees differ from the white banded ones, as no training restriction buffers are placed around them. Typically trees marked with two light green bands are those that have cavity entrances that are too large for restrictors, cavities that are no longer useable, or cavity trees that have been inactive for 5 or more years.

A buffer 200 feet around each cavity tree in active clusters and provisioned recruitment clusters will be marked with warning signs posted at reasonable intervals facing to the outside of the buffer and along roads, trails, firebreaks, and other likely entry points into the buffer. Where cavity trees are within 400 feet of each other, the marked buffer will overlap and surround the aggregate of trees. Where cavity trees are separated by more than 400 feet, separate marked buffers will result. Signs posted at the marked buffer will be constructed of durable material, ten inches square (oriented as a diamond), and white in color. A RCW graphic and the lettering "Endangered Species Site" and "Red-cockaded Woodpecker" will be printed in black. The lettering "Do Not Disturb" and "Restricted Activity" will be printed in red. All lettering will be 3/8 inches in height.

Buffer markings may be removed around cavity trees which will not be managed that occur in active clusters and provisioned recruitment clusters (e.g., trees with cavity entrances that are too large for restrictors, cavities that are no longer useable, or cavity trees within active clusters that have been inactive for 5 or more years). Generally, removal of the buffer will depend on the trees location relative to other, managed cavity trees. The decision whether to remove the buffer markings will be made by an RCW biologist. Living cavity trees where buffers have been removed will be painted as previously described with two green bands.

The RCW biologist will determine if the buffer should be marked when new cavity trees are created by RCWs around existing buildings or facilities. Buffers will not be marked in the EIA because these areas are not utilized for land-based maneuver training.

5.7.2. Training

The protection of clusters and recruitment clusters on Fort Jackson depends on an understanding of the goals and requirements of RCW conservation by the military personnel training on the installation. Soldiers are informed of endangered species information and training restrictions as part of the Environmental Compliance Officer course.

Damage and disturbance in clusters outside the EIA is controlled by Fort Jackson Regulation 350-14 (Range Regulation). Entry into and training in an RCW cluster is strictly regulated. Standard training guidelines state that military training within 200 feet of marked cavity trees is limited to activities of a transient nature (less than two hours occupation). Appendix 1 of the Guidelines (Appendix C of this ESMC) provides a list of prohibited and permitted training activities in marked buffer zones around cavity trees.

Training restrictions will apply only within marked buffer zones around cavity trees. The restrictions will apply to a recruitment cluster once it is provisioned and the cavity trees and buffer are marked. Cavity trees marked with two light green bands, as previously discussed, will not have buffer zones marked or training restrictions.

Military personnel are prohibited from cutting down or intentionally destroying pine trees without prior approval of the DPW Wildlife Branch. Pine removal installation-wide must be approved through environmental review procedures prior to their removal. These restrictions do not prohibit DPW natural resources personnel from using prescribed fire, silviculture treatments, or any other accepted management practice in the performance of their mission.

Even though damage to cavity trees is not expected, military units are required to report damage to any cavity tree or extensive soil disturbance within and around marked cavity tree buffers to Range Operations. Range Operations, as soon as possible after notification is received from the unit, will report this damage to the DPW Wildlife Branch, which will assess the damage.

An artificial cavity will be constructed within 48 hours if a cavity tree is destroyed in an active cluster or provisioned recruitment cluster. Cavity trees destroyed in the EIA, which will likely be discovered only by natural resources personnel entering clusters in this area, will be replaced when access to construct replacements is permitted. Significant soil disturbance within or adjacent to marked buffers outside the LMA will be repaired as soon as practicable to prevent degradation of RCW habitat. All digging for military training activities in the HMU will be filled by Soldiers and inspected by Range Operations upon completion of training.

If the measures previously described fail to control damage and disturbance, trails and firebreaks located within the cluster may be closed by erecting gates, and, if necessary, allowing these areas to re-vegetate. Fort Jackson will consult with the FWS prior to the establishment of new trails, roads, or firebreaks which permit vehicle travel through an RCW cluster.

5.8 Translocation

Translocation is the artificial movement of wild organisms between (interpopulation) or within (intrapopulation) populations to achieve management objectives. As described in the Recovery Plan, translocation can be used for several applications. On Fort Jackson, translocation will be used for augmentation, strategic recruitment, and for management of genetic resources.

Augmentation is a means of buffering small populations against the effects of demographic and environmental stochasticity. On Fort Jackson, this will be accomplished by moving a potential mate to a cluster inhabited by a solitary individual (mate provisioning) or by moving pairs to recruitment clusters to increase the population size (augmentation). Strategic recruitment is achieved by moving birds from within or between populations to recruitment clusters strategically located to link groups and subpopulations. This type of recruitment cluster creation and translocation will be targeted at developing beneficial spatial arrangements to increase the persistence and health of RCW clusters and the overall population. Strategic recruitment will be

accomplished by both mate provisioning and augmentation. Genetic resources will be added by the introduction of individuals from other populations, improving the overall genetic diversity of Fort Jackson's RCW population.

Fort Jackson exceeded the critically small population threshold of 30 PBGs in 2011 (31 PBGs) and may be taken off the list of eligible recipient populations. However, continued eligibility for translocation of pairs from other populations would benefit population stability and growth. Translocation of pairs will be used strategically to introduce RCWs to unoccupied habitat that is somewhat distant from the core of the population, and is often separated by currently unsuitable habitat. Efforts will be made to move eligible birds on Fort Jackson from existing clusters to unoccupied habitat. However, RCWs eligible for translocation on Fort Jackson are few because of our small population size. For this reason, Fort Jackson is requesting consideration to receive RCWs from other populations over the next several years with the goal of growing our population into previously unoccupied segments of the HMU.

Translocation procedures as described in Section 8.H. and Appendix 3 of the Recovery Plan will be followed. Modification to the processes outlined in these guidelines may be necessary if birds are translocated into the EIA due to access limitations. Translocations will not be undertaken without the approval of and close coordination with the FWS. Fort Jackson has obtained an ESA Section 10 permit (endangered species) for RCW management, including translocations. Persons marking, banding, and handling birds shall have the appropriate permits prior to performing these activities, or be in the presence of permitted individuals. Permits will be kept current.

6.0 MONITORING PLAN

6.1 Habitat Monitoring

Comprehensive surveys for new cavity trees and clusters were already conducted on Fort Jackson. Detection of previously unknown cavity trees or clusters typically occurs coincident to annual inspections of known clusters and adjacent habitat areas, or during other management activities by natural resources personnel. Natural resources personnel will report any new activity observed during their routine work. Surveys in previously unoccupied habitat will be conducted if the RCW biologist determines that changes in habitat conditions or population distribution increases the likelihood of RCW occurrence. Survey data will be used to generate installation RCW maps accurately depicting the location of RCW clusters. The maps will be widely distributed for use by those conducting land use activities on the installation. Maps will be updated at least annually.

Fort Jackson will assess the quality and quantity of installation-wide foraging habitat using the FWS Matrix tool at a minimum of once every 10 years and midstory at a minimum frequency of once every 5 years in the HMU. Foraging habitat will be assessed for all elements identified in the Recovery Plan under Paragraph 8.I. While much of Fort Jackson's HMU does not currently meet these standards, the desired future condition for RCW foraging partitions is the recovery standard. These analyses were last completed in 2012, Appendix F.

Forest stand inventories are needed periodically to properly manage the forest, including RCW nesting and foraging habitat. Forest stand inventories will be conducted according to accepted sampling techniques. Inventories on the ground will only be accomplished where deemed safe. The last forest inventory on Fort Jackson was completed in 2011.

Fort Jackson will keep accurate records of the timing and extent of all prescribed and wild fires in the RCW HMU. These records will be maintained in a GIS database.

6.1.1 Cluster Status and Condition Inspections

Active clusters, selected inactive, and provisioned recruitment clusters will be inspected annually (or more frequently). These are prescriptive inspections, used to develop treatments and modifications of treatments to maintain suitable nesting habitat. Inspections in the LMA will be performed upon approval of Range Operations and the Safety Office. At a minimum, Fort Jackson will inspect and record data for:

(1) density and height of hardwood encroachment;

(2) height of new RCW cavities (the initial inspection measured height of all existing cavities);

(3) condition of cavity trees and cavities;

(4) a description of damage from training, fires (prescribed or wild), etc.

(5) evidence of RCW activity for each cavity tree (includes each cavity in the tree) within the cluster.

Inspections of inactive clusters will include observations of the condition of live cavity trees and a ground examination of cavities for activity. Closer inspection of cavities which appear from the ground to be active may be conducted. Inactive clusters containing cavities which appear from ground or close inspection to be active will be group checked for the presence of RCWs and those trees found to be active will be managed according to this ESMC. The FWS will be consulted regarding management of those found active outside of the HMU.

6.2 Project Surveys

Surveys are used to determine whether the nesting and/or foraging habitat of a RCW group will be adversely impacted by a proposed project, such as a timber sale or range construction. The guidance provided in Section 8.I. and Appendix 4 of the Recovery Plan will be followed for project surveys. Prior to any timber harvesting operations, construction, or other significant land-disturbing activities in suitable habitat on Fort Jackson, a survey of the affected area for unknown cavity trees will be conducted. The "affected area" for RCWs includes the project site plus the area within 1/2 mile of the project boundary. The surrounding 1/2 mile is included

because projects have the potential to remove foraging habitat for an unknown active cluster which may be located within 1/2 mile. Locating such a previously unknown cluster would require ensuring adequate foraging habitat remains for it and any other cluster(s) within 1/2 mile of the project site.

The boundary of the project site is determined by evaluating the impacts of the project to the area. For example, the project site to be surveyed for the construction of a range will consist of the area to be cleared for the range plus the surface danger zone (area potentially affected by the firing of the weapons) for the weapons. The area to be adversely impacted is determined through consideration of such factors as the weapon systems involved, the presence or absence of effective berms, and the topography of the site and its surroundings. In this case, the project site consists of the area where tree mortality is most likely to occur due to the firing of weapons on the range.

For all categories of projects other than projects not requiring surveys and projects requiring surveys of only the project site, a survey of the project site and affected area will always be conducted. Forestry project sites generally cover larger acreages than construction projects; however, forestry projects are designed to provide better habitat for the RCW. For forest thinning projects, natural resources personnel will survey pines for undocumented cavities in the project site during timber marking activities, and this will suffice as a survey of the project site. For logging operations where timber is not marked by Fort Jackson natural resources personnel (i.e. operator select harvesting), the site will be surveyed for undocumented cavity trees prior to the timber sale. Project site surveys for single-tree or group selection regeneration projects will be treated similar to a thinning as discussed above.

Surveys will not be conducted off-post. The relatively small amount of nesting habitat which exists around Fort Jackson generally has extensive hardwood midstory problems. Also, the South Carolina Department of Natural Resources (SCDNR) has not located any RCW clusters in the vicinity of the installation. SCDNR has a statewide database of known RCW clusters that is available upon request.

All of the varied projects conducted at Fort Jackson do not require surveys of the entire affected area. Projects at Fort Jackson are being placed in categories as discussed in the following subsections. For safety reasons, no surveys will be performed in the EIA (see Section 7.1).

6.2.1 Projects Not Requiring Surveys

Surveys will not be conducted for certain categories of projects (unless they are deemed necessary by a RCW biologist) as follows:

(1) Projects in habitat unsuitable for the RCW. Unsuitable habitat includes areas that are not nesting habitat and do not fulfill the definition of foraging stands.

(2) Prescribed burning.

(3) Projects not requiring pine tree removal.

(4) Project sites in the cantonment areas.

(5) Projects that require only removal of pine trees under four inches dbh. Removal of pines less than four inches dbh normally will have no adverse impact because RCWs usually forage on larger pines and cavities are not typically constructed in pines this small.

6.2.2 Projects Requiring Surveys of Only the Project Site

This category of projects only involves inspecting the potential cavity trees to be removed. Projects include:

(1) Projects on the installation requiring removal of 10 or fewer pine trees greater than four inches dbh. Long, linear projects (e.g., powerline maintenance) removing 10 or fewer pines of this size within any 1/2 mile stretch are included. Unless an RCW cavity is present, removal of such a small number of pines, which may be potential foraging habitat, is highly unlikely to adversely impact this endangered species.

(3) Timber salvage operations. Salvage will be limited to trees expected to succumb, unless the cause of tree damage is expected to spread (e.g., diseases or pest infestations). If damage spread is expected, additional trees may be removed to curtail damage to surrounding areas. A wildlife biologist may determine that dying pines should be left standing if the disease or infestation is unlikely to spread, and the resultant snags will not create safety hazards.

6.2.3 Projects Requiring Survey of the Project Site and Surrounding 1/2 Mile

Surveys for all projects not discussed previously in Section 6.2 will be conducted following the guidelines set forth in Appendix 4 of the Recovery Plan. Discussions in this section address military training exercises and activities, construction projects, and forestry projects.

The first step in the survey procedure is to determine if suitable nesting or foraging habitat exists in the area to be impacted by the project. If no suitable habitat is identified, further assessment is unnecessary and a "no effect" determination is appropriate. If no suitable nesting habitat is identified, but suitable foraging habitat is present and will be impacted, potential use of this foraging habitat by groups outside the project boundaries must be determined. This is determined by identifying any potential nesting habitat within half mile of the suitable foraging habitat that would be impacted by the project. Survey protocols discussed in Appendix 4 of the Recovery Plan will be followed to identify any active clusters. If no active clusters are found, then a "no effect" determination is appropriate. If one or more active clusters are found, a foraging habitat analysis will be conducted to determine whether sufficient amounts of foraging habitat will remain for each group post project. This analysis will be completed using the RCW Matrix Tool and forest inventory information contained in Fort Jackson's GIS forest inventory database.

Projects that are likely to adversely affect RCW habitat and recovery will be subject to formal consultation with the FWS. The guiding principle of these surveys, as noted in the Recovery Plan, is that, if the installation can demonstrate reasonable progress toward meeting the recovery standard and support of IPGs, most projects can be implemented. For a more detailed discussion of reasonable progress see Section 8.I. of the Recovery Plan.

6.3 Population Monitoring

Fort Jackson will conduct scientifically sound monitoring programs to determine demographic trends within the RCW population as a whole. Population monitoring will follow the Guidelines which states that all active clusters will be monitored annually in populations with less than 100 active clusters. Monitoring in the LMA will occur upon approval of Range Operations and the Safety Office.

Fort Jackson currently has 37 active clusters which will all be monitored for demographic trends. When the number of PBGs exceeds 100, 50% of the RCW clusters will be intensively monitored for demographic trends. All clusters will continue to be monitored for activity status, regardless of population size. Monitoring activities will be performed annually to determine the number of adults and fledglings per site, sex of birds, number of breeding groups, and number of nests. Birds will be color banded to enable the monitoring of group size and reproductive success. Banding will follow the procedures set forth in Appendix 2 of the Recovery Plan. Monitoring results will be recorded and retained permanently so trend analysis is possible.

Provisioned recruitment clusters will be group checked biannually to determine their status (i.e., active or inactive) and if additional monitoring is required. These checks will determine which sites have been activated either by successful translocation or by natural dispersal. The newly active recruitment clusters will be monitored as described in the previous paragraph.

6.4 Sharing Data with the FWS

Fort Jackson will report RCW population data, all actions taken to recruit RCWs, and habitat improvement measures to the FWS annually by January 31 using the Digital Annual Reporting Tool or other methods required by the FWS. Copies of this annual report will also be provided to the local FWS field office in Charleston, SC and to the SCDNR. A report summarizing population trends and management activities will also be given at an annual Army/FWS RCW meeting, typically in February or March of each year.

If data suggest that Fort Jackson's population is declining, the FWS will be consulted to determine if a plan is needed to prevent further decline. If needed, a plan will be developed in consultation with the FWS. Critical population decline is defined in two different ways. A population is considered declining if either of the following criteria is met:

(1) the number of active clusters decreases by 10% from one year to the next.
(2) the number of active clusters decreases by 10% within five years.

Captured clusters will not be included in this calculation.

6.5 Ten-year Forest Inventory

Fort Jackson's original forest inventory was completed in 1992. After this initial inventory was completed, it was decided to inventory 10% per year, rather than re-inventory every 10 years. However, due to resource limitations this was never accomplished. An installation wide inventory was initiated in 2009 and was completed in 2011. The final product includes new data for all current and potential RCW habitat in the SDMA. Surrogate data from comparable stands outside the LMA will be used to update inventory data for potential habitat stands in the LMA. The update to the LMA stand data will be completed in 2013. This forest inventory data will be used in five years to revise the HMU as part of the 5-year ESMC revision.

In conducting the forest inventory, data will be gathered to accurately determine the quantity and quality of available foraging and nesting habitat for the RCW. Forest inventories will be conducted using the point sample cruise. Forest inventories in the LMA may be conducted using scientifically accepted, aerial photography interpretation methods.

7.0 HABITAT MANAGEMENT UNIT

Fort Jackson has designated a RCW HMU which contains enough existing or potential nesting and foraging habitat to attain and sustain the installation RCW population goal. Fragmentation of nesting habitat was avoided in designating this HMU and corridors will connect all nesting areas allowing for demographic interchange throughout the installation population. Delineation of this HMU is an important step in the planning process because it influences the future geographic configuration of the installation RCW population. Updating the HMU will be an ongoing process (see Section 8.7), and the areas designated as HMU will be managed according to this RCW ESMC.

Management activities and practices in the HMU will be consistent with the conservation of other Federally listed species and those proposed for listing. Conservation of candidate species will be considered to the extent possible. Fort Jackson will consult with the FWS should conflicts between management of the RCW and another Federally listed species arise.

As described in Section 4.1, the HMU consists of the LMA and SDMA. Total land area to be managed, population goal, and characteristics unique to the LMA are presented in the following section. Only the total land area to be managed and population goal are presented for the SDMA, because the standard management practices have been described in previous sections.

7.1 Limited Management Area (LMA)

Current and previous impact/danger areas that contain or likely contain UXO can pose danger to personnel. Natural resources conservation benefits to be gained by intensive management in high risk areas are not justified.

Several areas on Fort Jackson contain dangerous UXO. These have been identified as the LMA (Figure 4). The East Impact Area (EIA) contains unexploded artillery and mortar rounds, and other types of UXO. A section of this impact area, the Artillery and Mortar Target Zone (AMTZ), is heavily dudded and continues to receive fired munitions which may produce additional UXO. Munitions which miss the AMTZ or are deflected from it will continue to create hazards in the area surrounding the AMTZ. The ability to conserve RCW habitat in this impact area is questionable because use of weapons, including high-explosives and those that produce shrapnel, are being fired into this area. Weapons used at Fort Jackson, and weapons being developed may reduce habitat conservation possibilities even further. The presence of UXO limits the ability of natural resource personnel to perform specific activities which would help maintain pine or pine-hardwood forest (i.e. planting and thinning pines), or improve habitat conditions for the RCW (e.g. midstory control).

Typically, Fort Jackson personnel prescribe burn the EIA annually, or portions thereof, utilizing aerial ignition. Biologists have managed clusters to some extent, in this impact area while being escorted by explosives experts from an Army Explosive Ordnance Detachment (EOD), or once EOD had surface cleared the clusters, their surroundings, and any access routes. Examples of management techniques used in the past include: inventories, monitoring, raking of cavity trees where permitted, and construction of artificial cavities. All RCW management activities will be performed in the LMA, including the EIA, as described previously in this ESMC except those modified or excluded below.

No soil disturbing activities, including those requiring use of vehicles, will be performed in the LMA. This includes such activities as harvesting and planting trees and controlling hardwood midstory via mechanical or chemical means. Midstory can be controlled through injection of herbicides, though this method of controlling midstory will only be used in clusters where this is considered safe and practical. Aerial applications of herbicides for the control of hardwood midstory may be attempted if considered safe and environmentally sound. Management that does not cause soil disturbance (e.g., inventories, placement of restrictors, and construction of artificial cavities) is possible if considered safe by EOD, Range Operations and the Safety Office.

Tracer bullets and other munitions fired into the EIA normally cause annual fires, which may occur during any season. Prescribed burns to reduce fuels available to wildfires are typically conducted annually to minimize the possibility of a severe or uncontrollable wildfire. Other areas of the LMA are prioritized for burning at least every three years, but may not be burned because of management and safety considerations. These areas must be burned using aerial ignition because of safety concerns. Protecting cavity trees during prescribed burns will be accomplished by raking fuel away from the cavity trees when permissible. Artificial cavities will be used to replace cavities damaged by fire.

Surveys for new cavity trees will not be conducted in the LMA. Surveying is considered particularly dangerous, even with an escort, because surveyors are observing the stems of trees instead of looking for UXO on the ground. Aerial surveys for new cavity trees will only be conducted if cost effective.

Conversion of stands to create additional habitat in the LMA is not possible because this would require soil disturbing activities (e.g., planting trees). This limits our management for the RCW to existing pine and pine-hardwood stands. In the EIA, annual wildfires and prescribed burning, which are not conducive to the regeneration of pines, and the inability to perform various forest management techniques will limit the maintenance of pine and pine-hardwood stands. The extent to which munitions are affecting these stands is unknown, but may be contributing to a long-term reduction in these stand types in the EIA. This may restrict our ability to maintain active clusters for the long-term in the EIA.

Some of the best RCW habitat currently available on Fort Jackson is in the EIA. Presently, there are eight active clusters in the EIA. Eight clusters will be maintained as long as habitat is available. RCWs can be translocated into the EIA for augmentation or mate provisioning. These eight clusters will count toward the IPG as long as they can be monitored in accordance with Recovery Plan criteria to determine group size. However, access for monitoring and management is currently very limited and may become more so due to increased utilization of the ranges that fire into the EIA. If access becomes so limited that groups cannot be monitored in accordance with Recovery Plan guidelines, consultation with the FWS will be initiated.

LMA areas outside of the EIA are not currently impacted by active ranges and do not burn annually. However, management is limited due to UXO and safety considerations. Management of other areas containing UXO will be similar to that previously described for the EIA, with the exception of the burning regime. Burning will be conducted by aerial ignition or by ring fire technique, if considered safe, in these areas.

None of the other UXO contaminated areas in the LMA contain enough existing pine or pine-hardwood forest to completely support a RCW cluster and foraging habitat. Most of the areas are widely separated and cannot be managed in conjunction with one another to support a cluster. However, one recruitment cluster was provisioned in the LMA outside of the EIA (Cluster 12B-A). This cluster had been inactive for over 10 years, but was reactivated in 2008. In consultation with the FWS, the cluster was provisioned with cavities in 2009 (FWS Log No.: 42420-2009-TA-0356). It has been occupied by a breeding pair since 2010, successfully breeding each year since then. Foraging habitat for this cluster is provided on Fort Jackson LMA and by property owned by the Department of Veterans Affairs on the Fort Jackson National Cemetery. Other than this recruitment cluster, the manageable acreage within these UXO areas outside the EIA will not affect (i.e., increase) the population goal for Fort Jackson. These areas will continue to be managed as described previously because each one with manageable habitat can provide at least a portion of one of the two main habitat components (i.e., nesting or foraging habitat). For example, the best available nesting habitat in an area may be in one of these sites containing UXO. In conjunction with some available forage habitat outside, but contiguous to, the UXO area, a cluster could be supported in the UXO area. The long-term viability of pine and pine-hardwood stands in these areas is also questionable.

7.2 Standard Density Management Area (SDMA)

The SDMA covers approximately 22,212 acres (Figure 6). The FWS has indicated that a population density of one group per 200 acres is manageable in the sandhills physiographic province, which includes Fort Jackson. The SDMA should support this density, thus, 111 active clusters is the population goal for the SDMA.

8.0 SPECIAL CONSIDERATIONS

8.1 Inactive Cluster Deletions

Deletion of inactive clusters, not appropriate for recruitment in the next ten years, will prevent problems in managing the RCW population on Fort Jackson. For example, where current foraging habitat and that which can be developed in the next 5 years will not support both an inactive cluster(s) and a more suitable recruitment cluster, deletion of the inactive cluster(s) is the best option. The inactive cluster(s) can become a recruitment cluster when the appropriate habitat is developed, if it is the best choice at that time. Clusters that have been monitored inactive for more than 5 years and are not planned for recruitment in the next 5 years will be deleted from management. Cluster deletion in these areas will permit resources to be directed where maximum benefits to the RCW will be realized.

Cavity trees in deleted clusters will remain in place and be protected as described in Section 5.7 of this document. However, the 200 ft buffer signs will be removed and the associated military training restrictions will no longer apply. Cavity entrances will not be covered unless reactivation of the inactive cluster would be harmful to RCWs or the cluster is not in the HMU and reactivation would conflict with critical missions (e.g., an inactive site near the firing line of WIA Range 19). Inactive clusters to be deleted on Fort Jackson will be determined by a RCW biologist in accordance with the Recovery Plan. Cluster deletion will occur only with the approval of the FWS.

8.2 Incidental Take

Incidental take of an RCW, both directly and through removal of habitat, may occur during management activities designed to conserve this species. During consultation with the FWS, Fort Jackson will request incidental take of RCWs for the following management activities:

(1) Prescribed burning- SDMA

Individual RCWs, nests containing eggs and/or nestlings, cavity trees, and foraging habitat can be injured or destroyed as the result of prescribed burning. Measures taken to prevent damage or

destruction to RCWs and/or cavity trees include raking or burning around cavity trees and the use of water and fire retardant materials. Foraging habitat is protected during prescribed burns by preparing and implementing a burn plan. The burn plan describes parameters such as weather and fuel conditions and equipment and personnel required to accomplish prescribed burn objectives while not adversely affecting RCW habitat. Even with these precautions, local weather changes, higher than estimated fuel loads, and other unforeseen factors may cause escaped prescribed burns or out of prescription burns. Measures will be taken to extinguish prescribed burns that are out of prescription. Fire plows will be used in clusters only during emergency situations. Fire plows cannot be used in the LMA due to UXO hazards. As a worst case, Fort Jackson anticipates two incidental takes, over the 5-year life of the RCW ESMC, as a result of prescribed burning. This take may be in the form of harass, harm, wound or kill, loss of nest, active cavity, or adult.

(2) Activities Inside LMA

The presence of UXO in the LMA may prevent the use of reasonable and prudent fire protection measures such as raking or burning around cavity trees. Standard fire suppression activities cannot be performed within the LMA. Wildfires are controlled at the perimeter of the LMA only. Therefore, incidental take may occur as a result of wildfire. Additionally, incidental take in the EIA may occur due to munitions being fired into this area. Incidental take for all clusters in the LMA, including recruitment clusters, is requested (9 clusters). Incidental take for all clusters in the EIA was previously given (8 clusters) (FWS Log No. 4-6-00-F-199).

Installation staff will immediately notify their major command and the FWS in the event of an incidental take.

8.3 Metal Contaminated Areas

Clusters and surrounding foraging area in the EIA will be designated as "no fire areas" to the degree practicable to protect clusters from projectile damage. There are no current plans to increase the number or effectiveness of berms on existing ranges. Berms are recommended for the construction of new ranges to limit down-range habitat damage. All proposed new range construction will be evaluated for impacts to endangered species, and consultation with FWS performed.

Forest stands adjacent to the EIA that have been heavily damaged by small arms projectiles and continue to receive metal contamination have been deleted from the HMU. These areas are not considered manageable for the long-term.

8.4 Conservation on Adjacent Lands

Necessary habitat for the RCW includes nesting and foraging areas. Both of these habitat components for a given cluster may be located entirely on installation lands, or there may be instances where one of these components is located on installation land and the other is located on adjacent or near-by non-Army land. The FWS and Fort Jackson will initiate cooperative

management efforts with these landowners, if such efforts would complement installation RCW conservation initiatives.

8.5 Ecosystem Management

Conservation of the RCW and other species is part of a broader goal to conserve biological diversity on Army lands consistent with the Army's mission. Biological diversity and the long-term survival of individual species, such as the RCW, ultimately depend upon the health of the longleaf pine ecosystem; therefore, the success of Fort Jackson's RCW ESMC depends on longleaf pine ecosystem integrity. Management of this ecosystem will benefit a variety of species, including the RCW. Maintenance of ecosystem integrity and health also benefit Fort Jackson, the Army, and our Nation by preserving and restoring training lands for long-term use.

8.6 Regional Conservation

The interests of Fort Jackson and the RCW are best served by encouraging conservation measures off the installation. Fort Jackson has participated in efforts to conserve RCWs and longleaf pine on private lands in the vicinity of the installation. Fort Jackson will continue to participate in promoting cooperative RCW conservation plans, solutions, and efforts with other Federal, State, and private landowners in the surrounding area.

8.7 Maintaining the HMU

One of the major challenges Fort Jackson will face over the long-term is maintaining the size of the HMU. The main reason is the HMU was designed with knowledge of only short-term mission requirements. The current mission of the military is in a state of change, which will likely affect even short-term mission requirements of the installation. It may be difficult to restrict all new facilities and ranges to areas outside the HMU if additional or new missions are brought to Fort Jackson.

Should a significant change in the military's missions at Fort Jackson occur, we would have to expand facilities to train additional soldiers. In the event that installation expansion is required, Fort Jackson will consult with the FWS regarding potential adverse impacts to the RCW.

Unplanned projects are likely to occur in the HMU. Consultation with the FWS regarding a change to the HMU and IPG will not be initiated unless the cumulative removal in five years exceeds 200 acres of the SDMA. Projects requiring removal of less than 1/4 acre of the HMU will not be tallied. Consultations will be conducted on situations potentially affecting active clusters, recruitment clusters, or their foraging habitat outside the scope of this ESMC. Consultations will be initiated before major construction projects in the HMU, such as new ranges, are initiated. The ESMC, including the HMU and resultant population goal, will be reviewed annually and revised as necessary every five years.

8.8 Cooperation with the FWS

Fort Jackson will work closely and cooperatively with the FWS on RCW conservation and ecosystem management. The installation will routinely engage in consultation with the FWS to ensure that proposed actions are consistent with ESA requirements. Consultation, if necessary, will be initiated prior to any significant changes to this plan.

9.0 EFFECTS ON TRAINING

Implementation of this ESMC will have both positive and negative effects on training. Deletion of inactive clusters near critical training areas should reduce the possibility of conflicts at these sites by removing the training restrictions associated with 200 foot buffers of managed clusters. Any incidental take issued will reduce the liability of personnel for accidents which may occur. This ESMC document will help Fort Jackson planners in selecting locations for new construction and other projects.

A great deal of planning requiring close coordination between natural resources personnel and military personnel will be necessary to ensure any effects are minimized. This will be accomplished through the INRMP and its annual work plan. At times, the specific location of clusters interferes with field exercises designed to simulate battle conditions. However, this is not a major impediment to training. This may actually increase the effectiveness of the training by requiring commanders to be creative in overcoming this "obstacle," just as they would have to overcome obstacles encountered in battle.

The ESMC's effect on training in the long-term is more difficult to predict because of unforeseen changes. There will be more clusters where limitations on training may occur. If these sites average about 10 acres in size, about 700 additional acres will have restricted training. Thus, the potential for clusters to affect certain types of field training exercises may increase.

Time required to review projects planned in or near the HMU may increase as the number of active clusters increases. This is due, for example, to the more frequent cavity tree surveys that will be required. The open, park-like pine stands to be created and maintained, in combination with leaving bottomland and some upland hardwoods, should provide suitable conditions for basic training. Another benefit to Fort Jackson may be that certain training restrictions may be relaxed or removed as the population increases.

10.0 RESOURCES REQUIRED

The planning and funding period for the implementation of this ESMC is five years, though some components extend beyond this time frame. The estimated required staff is currently available within the Environmental Division (ENV) Table of Allowance & Distribution (TDA). In addition to the required staff, assistance from other agencies and contractors will be required to implement all the tasks outlined in this ESMC. Assistance is required in performing annual

surveys for cavity trees, reforestation activities, habitat improvements, prescribed burning, and translocating RCWs to Fort Jackson.

Sufficient equipment needed to support implementation of this ESMC is accounted for within the ENV. Additional equipment needs identified will also be obtained and accounted for by the ENV.

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APPENDIX A

Glossary

Basal area (BA) - The cross-sectional area (in square feet) of trees per acre measured at approximately four and one-half feet from the ground.

Buffer/ buffer zone - The zone extending outward 200 feet from a cavity tree in an active cluster or provisioned primary recruitment cluster. In stated cases, the buffer applies to inactive clusters.

Cavity - An excavation in a tree made by a RCW, or artificially created, for roosting and/or nesting. A cavity is active if a RCW is using it for roosting or nesting.

Cavity restrictor (restrictor) - A metal plate that is placed around an RCW cavity entrance to prevent access by larger species. A restrictor also prevents a cavity from being enlarged, or if already enlarged, shrinks the cavity entrance diameter to a size that prevents access by larger competing species.

Cavity tree - A tree containing one or more active or inactive RCW cavities or cavity starts.

Cluster - The total area encompassing cavity trees occupied or formerly occupied by an RCW group plus the buffer zone. Clusters currently occupied are termed active clusters and those currently unoccupied inactive clusters.

Cluster stand - The forest stand containing a RCW cluster. Normally, at least 10 acres are managed to create preferred nesting habitat. Training restrictions apply to the entire cluster but not necessarily the entire cluster stand.

Diameter at breast height (dbh) - The diameter of a tree at approximately four and one-half feet from the ground.

Group - A social unit of one or more RCWs that inhabits a cluster. A group may include a solitary, territorial male; a mated pair; a pair with helpers; or a pair with both helpers and young.

Group check - Being present in a cluster when RCWs leave or return to the cavity trees to gather information such as group size and specific trees being used for roosting.

Habitat Management Unit (HMU) - Designated area(s) managed for RCW nesting and foraging, including clusters and areas determined to be appropriate for recruitment. The HMU is made up of two areas, the LMA and SDMA.

Helper - Offspring from previous years that remain in an active cluster, usually with the genetic parents, and help with such activities as constructing cavities and feeding young of the current year.

Impact area - The ground within the training complex used to contain fired or launched ammunition or explosives and the resulting fragments, debris, and components from various weapons systems.

Incidental take - The "taking" of a listed threatened/endangered species which is incidental to, but not the purpose of, an otherwise legal activity (FWS 1988).

Limited Management Area (LMA) - That portion of the HMU that contains unexploded ordnance and, for safety and other reasons, permits only limited management of the RCW and its habitat.

Mission - This term is used in a broad sense to mean all training and activities in support of training. Essentially all activities that normally occur on an Army installation are included.

Mission requirements - Normally refers to land-use allocations for training and support activities which preclude use of the area for RCW habitat management.

Off-site - A species other than the one expected to be growing on a site based on the physical and biological characteristics of the site. Characteristics such as soil type, moisture regimes, and other types of vegetation present are used to determine which species should be growing on the site.

Population - An aggregate of groups which are close enough together so that the dispersal of individuals maintains genetic diversity and all groups are capable of genetic interchange. Population delineations should be made irrespective of land ownership.

Potential Breeding Group (PBG) - An adult female and adult male that occupy the same cluster, whether or not they are accompanied by a helper, attempt to nest, or successfully fledge young.

Recruitment cluster/site - The designation and management of habitat for the purpose of attracting a new group to that habitat. New recruitment clusters normally do not contain cavities and must be provisioned before they are suitable for RCW occupancy.

Regeneration - Replacement of a stand of old trees with a stand of young trees, normally either by planting seedlings or permitting seedlings to grow naturally. This term also refers to the young trees established on such a site.

Relict tree - A pine tree usually more than 100 years old having characteristics making it attractive to the RCW for cavity excavation.

Stand - An aggregation of trees occupying a specific area and sufficiently uniform in species composition, age, arrangement, and condition so as to be distinguishable from the forest on adjoining areas. Stands on Fort Jackson are typically at least 10 acres in size.

Standard Density Management Area (SDMA) - That portion of the HMU where standard management of the RCW and its habitat is possible. This portion of the HMU will be managed at a population density of one group per 200 acres of manageable area.

Translocation - The relocation of one or more RCWs, including movement of one or more birds into an active cluster, inactive cluster, or provisioned recruitment cluster. Normally, only one bird is moved into an active cluster.

APPENDIX B

Mission Requirements

Mission requirements (Figure 3) include any land-use activity which precludes management for RCW habitat. The small openings needed for the varied training requirements of all the types of units that use Fort Jackson are too numerous to mention individually. In addition, requirements vary from those related to fighting modern wars effectively to protecting historically significant cultural sites. Mainly large or obvious mission requirements are noted. Areas with numerous types of training are mentioned generally. In some cases, more than one use is occurring at a site (e.g., artillery firing points and helicopter landing zones).

Areas not considered manageable (e.g., developed cantonment areas) and the UXO areas (i.e., LMA), which are special cases, are not listed below.

Mission requirements include:

1. Artillery/mortar firing points
2. West Impact Area and other ranges
3. Helicopter landing zones
4. Ammunition storage point
5. Military Operations in Urban Terrain (MOUT) site
6. End of Cycle training area opening
7. Training area between Trainfire Road and Dixie Road
8. Driver training area opening
9. Contemporary Operational Environment (COE) sites
10. Tank trail expansion
11. Recreation area openings (Weston Lake, Fort Jackson Flyers Club)
12. Solid Waste Management Units
13. Archaeological sites, including a 50 meter buffer
14. Upland hardwood stands
15. Power line rights-of-way, roads, and firebreaks
16. Borrow pits
17. Demolition training site
18. Forward Operating Bases (FOBs)
19. Ranges

APPENDIX C

1 May 2007

Appendix 1

TRAINING ACTIVITY WITHIN BUFFER ZONES (1)	
MANEUVER AND BIVOUAC:	ALLOWED
Hasty defense, light infantry, hands and hand tool digging only, no deeper than 2 feet, 2 hours MAX	Yes
Hasty defense, mechanized infantry/armor	No
Deliberate defense, light infantry	No
Deliberate Defense, mechanized infantry/armor	No
Establish command post, light infantry	No
Establish command post, mechanized infantry/armor	No
Assembly area operations, light infantry/mech infantry/armor	No
Establish CS/CSS sites	No
Establish signal sites	No
Foot transit thru the cluster	Yes
Wheeled vehicle transit thru the cluster (2)	Yes
Armored vehicle transit thru the cluster (2)	Yes
Cutting natural camouflage, hardwood only	Yes
Establish camouflage netting	No
Vehicle maintenance for no more than 2 hours	Yes
WEAPONS FIRING	
7.62mm and below blank firing	Yes
.50 cal blank firing	Yes
Artillery firing point/position	No
MLRS firing position	No
All others	No
NOISE:	
Generators	No
Artillery/hand grenade simulators	Yes
Hoffman type devices	Yes
PYROTECHNICS/SMOKE	
CS/riot agents	No
Smoke, haze operations only, generators or pots, fog oil and/or graphite flakes (3)	Yes
Smoke grenades	Yes
Incendiary devices to include trip flares	Yes
Star clusters/parachute flares	Yes
HC smoke of any type	No

Appendix 1 (continued)

DIGGING	ALLOWED
Tank ditches	No
Deliberate individual fighting positions	No
Crew-served weapons fighting positions	No
Vehicle fighting positions	No
Other survivability/force protection positions	No
Vehicle survivability positions	No
NOTES:	
(1) These training restrictions apply to RCW cavity trees in training areas but not to cavity trees located in dedicated impact areas.	
(2) Vehicles will not get any closer than 50 feet of a marked cavity tree unless on existing roads, trails or firebreaks.	
(3) Smoke generators and smoke pots will not be set up within 200 feet of a marked cavity tree, but the smoke may drift thru the 200 feet circle around a cavity tree.	

ESMC

Approval Page

Approving Official:

MICHAEL S. GRAESE
Garrison Commander
US Army Fort Jackson

21 MAR 13
Date

Reviewed by:

TOM ROBERTSON
Director of Public Works

19 MAR 13
Date

RHETT A. RISHER
Director of Plans, Training and Mobilization

19 MAR 2013
Date

STEVEN B. WEIR
Colonel
Staff Judge Advocate

21 Mar 2013
Date

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT JACKSON
4325 JACKSON BOULEVARD
FORT JACKSON SC 29207-5015

March 27, 2013

Environmental Division

Mr. Jay B. Herrington, Field Supervisor
U.S. Fish and Wildlife Service
Charleston Field Office
176 Croghan Spur Road, Suite 200
Charleston, South Carolina 29407

Dear Mr. Herrington:

I have enclosed a copy of our revised Endangered Species Management Component (ESMC) for the red-cockaded woodpecker (Picoides borealis), along with a copy of our supporting Biological Assessment (BA). These documents are submitted to the U.S. Fish and Wildlife Service (FWS) to initiate a formal consultation pursuant to Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.). The ESMC is a component of Fort Jackson's Integrated Natural Resources Management Plan, which in its entirety is currently being updated.

The objective of this ESMC is to provide for the protection and enhancement of the red-cockaded woodpecker (RCW) population as required by the Endangered Species Act of 1973, as amended, while maintaining training readiness and other mission requirements of Fort Jackson. The ESMC has been revised to provide the most current scientific information available related to the status and conservation of the RCW on Fort Jackson, to update the known military mission requirements, and to adopt the guidelines and standard management procedures of the 2003 RCW Recovery Plan and those of the 2007 Management Guidelines for Red-Cockaded Woodpecker on Army Installations (U.S. Dept. of the Army 2007).

The purpose of the Biological Assessment is to provide the FWS with sufficient information to issue a biological opinion (BO), based on the best scientific and commercial data available.

I request that the FWS concur with our finding in the BA, and that you respond to us at your earliest convenience. If you have any questions or need additional information, do not hesitate to contact Doug Morrow at (803) 751-4793.

Sincerely,

Barbara S Williams

for Thomas L. Robertson
Director of Public Works

United States Department of the Interior

FISH AND WILDLIFE SERVICE
176 Croghan Spur Road, Suite 200
Charleston, South Carolina 29407

April 25, 2013

Mr. Thomas L. Robertson
Director of Public Works
Department of the Army
U.S. Army Installation Management Command
Headquarters, United States Army Garrison, Fort Jackson
4325 Jackson Boulevard
Fort Jackson, SC 29207-5015

Re: Initiation of Formal Consultation
Endangered Species Management Component for the Red-Cockaded Woodpecker
Fort Jackson, Richland County, South Carolina
FWS Log No. 2013-F-0207

Dear Mr. Robertson:

This letter acknowledges the U.S. Fish and Wildlife Service's (Service) April 9, 2013, receipt of your March 27, 2013, letter requesting initiation of formal consultation under the Endangered Species Act. The consultation concerns the possible effects of your proposed Endangered Species Management Component (ESMC) at Fort Jackson, Richland County, South Carolina on the red-cockaded woodpecker (*Picoides borealis*). The ESMC is a component of Fort Jackson's Integrated Natural Resource Management Plan, which is currently being updated.

All information required of you to initiate the consultation was either included in your letter, or is otherwise accessible for our consideration and reference. We have assigned log number (FWS Log No. 2013-F-0207), to this consultation. Please refer to that number in future correspondence on this consultation. Section 7 allows the Service up to 90-calendar days to conclude formal consultation with your agency and an additional 45-calendar days to prepare our biological opinion (unless we mutually agree to an extension). Therefore, we expect to provide you with our biological opinion no later than August 22, 2013.

If you have any questions or comments or require additional information regarding this letter, please contact Ms. Paula Sisson of my staff at 843-727-4707, ext. 226 and reference FWS Log No. 2013-F-0207.

Sincerely,

for Jay B. Herrington
Field Supervisor

JBH/PTS

cc: Mr. Will McDearman, U.S. Fish and Wildlife Service, Jackson, MS
Ms. Paige G. Koon, S.C. Department of Natural Resources, Columbia, SC

Figure 1 RCW Cluster Location

55 Total RCW Clusters with Status

Fort Jackson, SC

Total Installation Area = 51,313 acres

Fort Jackson South Carolina
ENVIRONMENTAL DIVISION
Environmental Management • Forestry • Recycling • Wildlife

16A-A
16A-B
16D-B
16C-A
16D-A
12B-A
12C-A
18B-B
32C-B
32A-A
32C-A
23C-A
29B-A
33B-A
33D-A
29C-A
33A-A
13D-A
29C-B
30B-A
34A-A
Imp-H
Imp-G
24B-A
31A-B
25A-B
34B-A
25A-A
30B-B
31A-A
Imp-E
26D-A
31E-B
31F-B
Imp-F
26A-B
31E-A
34C-A
Imp-D
31E-D
Imp-A
Imp-B
27D-C
26B-AR
Imp-C
27D-B
Rec-C
26B-A
31D-A
26C-B
26C-C
Rec-B
BA3-A
15C-A
Rec-A

Fort Jackson Cantonment

SCARNG Cantonment

RCW Cluster Status

- Active - 37
- Recruit - 13
- Captured - 1
- Inactive - 4

1:60,000

0 600 1,200 2,400 3,600 4,800 6,000 7,200 8,400
Meters

N

Coordinate System: WGS 1984 UTM Zone 17N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -81.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

Map POC(s)……..…….Mr. Philip Clauss / Mrs. Nicole Hawkins
philip.a.clauss.civ@mail.mil -- angela.n.hawkins4.civ@mail.mil

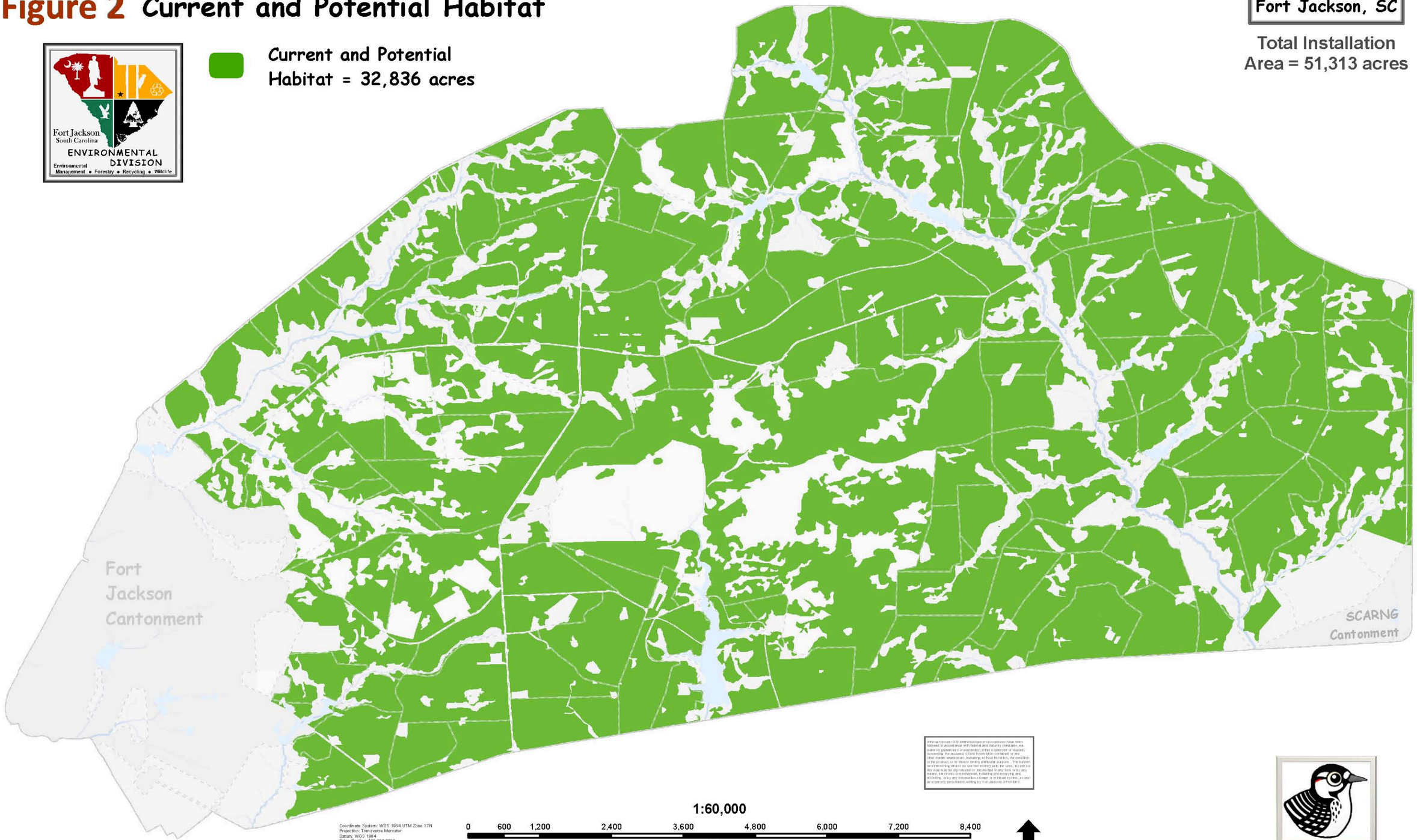
Figure 2 Current and Potential Habitat

Fort Jackson, SC

Total Installation Area = 51,313 acres

Fort Jackson South Carolina
ENVIRONMENTAL DIVISION
Environmental Management • Forestry • Recycling • Wildlife

Current and Potential Habitat = 32,836 acres



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Meters

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Map POC(s)…….....…….Mr. Philip Clauss / Mrs. Nicole Hawkins
philip.a.clauss.civ@mail.mil -- angela.n.hawkins4.civ@mail.mil

Figure 3. Significant Changes to the RCW HMU

Fort Jackson, SC

Fort Jackson South Carolina
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National Cemetery

DFIRST Area

N

West Impact Area

East Impact Area

Fort Jackson Cantonment

SCARNG Cantonment

0 1 2 4 Miles

1:60,000

- Mission Requirements - 8,787 acres
- Sampling of Additions to Mission Requirements
- Removal from Mission Requirements- DFIRST
- Cantonment Expansion

Figure 4 Limited Management Area

Fort Jackson, SC

Total Installation Area = 51,313 acres

Limited Management Area (LMA)
Total = 4,485 acres

East Impact Area

Fort Jackson Cantonment

SCARNG Cantonment

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0 600 1,200 2,400 3,600 4,800 6,000 7,200 8,400

Meters

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Projection: Transverse Mercator
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Units: Meter

Map POC(s).....Mr. Philip Clauss / Mrs. Nicole Hawkins
philip.a.clauss.civ@mail.mil -- angela.n.hawkins4.civ@mail.mil

User: philip.clauss Date Saved: 11/30/2012 2:05:14 PM

Name: hmu_figure_4_2012

Figure 5 Compartment One Management Area

Fort Jackson South Carolina
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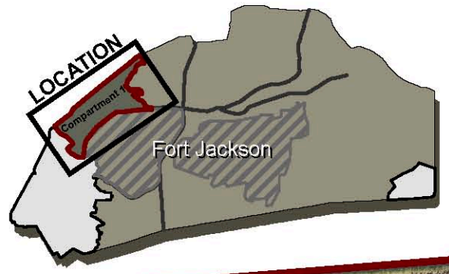
Stand Type

- Natural Pine - NP
- Pine / Scrub-Oak - PSO
- Pine / Hardwood - PH
- Hardwood / Pine - HP
- Open - OP
- Upland Hardwood - UH
- Bottomland Hardwood - BH; WF

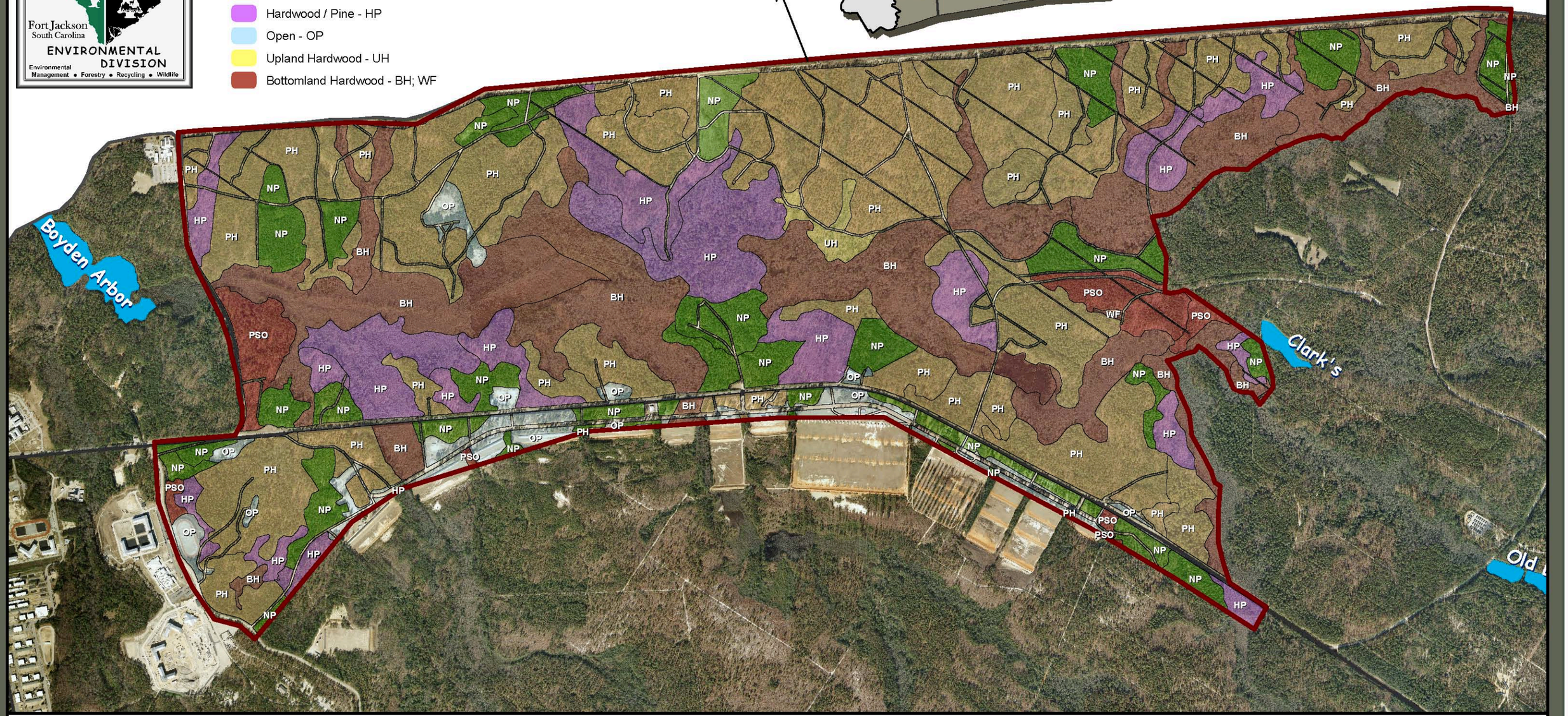
Compartment One Management Area

Compartment One = 2,369 acres



Fort Jackson, SC

Total Installation Area = 51,313 acres



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Meters

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Latitude Of Origin: 0.0000
Units: Meter

Map POC(s).....Mr. Philip Clauss / Mrs. Nicole Hawkins
philip.a.clauss.civ@mail.mil -- angela.n.hawkins4.civ@mail.mil

Figure 6 Habitat Management Unit (HMU)

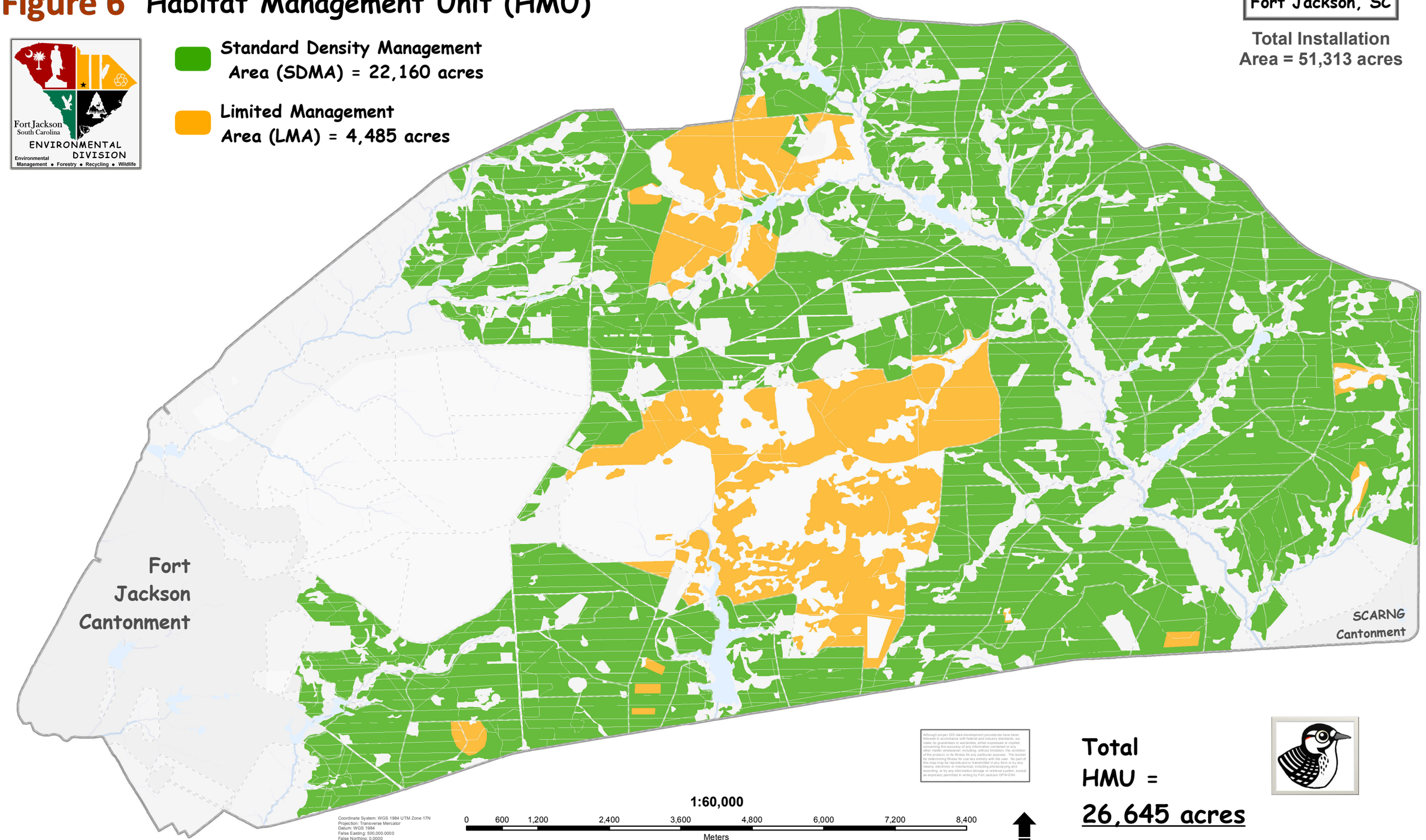
Fort Jackson, SC

Total Installation Area = 51,313 acres

Fort Jackson South Carolina
ENVIRONMENTAL DIVISION
Environmental Management • Forestry • Recycling • Wildlife

Standard Density Management Area (SDMA) = 22,160 acres

Limited Management Area (LMA) = 4,485 acres



Total HMU = 26,645 acres

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False Northing: 0.0000
Central Meridian: -81.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

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0 600 1,200 2,400 3,600 4,800 6,000 7,200 8,400

Meters

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Map POC(s).....Mr. Philip Clauss / Mrs. Nicole Hawkins
philip.a.clauss.civ@mail.mil -- angela.n.hawkins4.civ@mail.mil

Figure 7 Suitability Analysis Overview

- *Map/Layer updates will be available as surrogate LMA data becomes available.
- *Data for the LMA are incomplete and potentially inaccurate.

Fort Jackson South Carolina
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● RCW Cluster

Davy Crockett - 39.39 acres of Currently or Potentially Suitable Habitat into LMA

Fort Jackson, SC

Total Installation Area = 51,313 acres

West Impact Area
BRM

East Impact Area

Fort Jackson Cantonment

SCARNG Cantonment

Weston Lake

Dupre

Clark's

Old Bear Dam

Cobb's

Messer's

Oliver Creek

Cedar

Upper

Gadsden Creek

Boyden Arbor

Upper Legion

Lower

Catfish

Old Mill

Old Hated

Arrowhead

Big Water

South

Coordinate System: WGS 1984 UTM Zone 17N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: -81.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

1:55,000

0 550 1,100 2,200 3,300 4,400 5,500 6,600 7,700
Meters

N

Suitability

- Currently Suitable - 5,220 acres
- Potentially Suitable - 19,001 acres
- LMA - 4,485 acres
- Not Suitable - 302 acres
- Non Habitat - 11,143 acres
- Lake - 448 acres
- BRM 4,412 acres
- Fort Jackson Cant - 5,394 acres; SCARNG Cant - 908 acres

Map POC(s)……..Mr. Philip Clauss / Mrs. Nicole Hawkins
philip.a.clauss.civ@mail.mil -- angela.n.hawkins4.civ@mail.mil

APPENDIX D

Five Year Recruitment Plan

The 2007 Management Guidelines for the Red-cockaded Woodpecker (RCW) on Army Installations state that installations that have not yet met their population goals will implement actions to achieve a 5% annual increase in active clusters. The recommended number of recruitment clusters to achieve population growth rates of 5-10 percent per year is a constant supply equal to 10 percent of total active clusters in the population (U.S. Fish & Wildlife Service 2003). Based on this recommendation and an estimated population growth rate of 5%, Fort Jackson will provide 21 recruitment clusters by 2017. Currently there are 12 suitable recruitment clusters in the SDMA. At least 9 more clusters will be provisioned by 2017. If the population grows at a faster rate, more recruitment clusters will be provisioned in order to maintain a supply equal to 10% of the number of total active clusters. Per the U.S. Fish & Wildlife Service (FWS) guidelines, recruitment clusters will not be established at a rate higher than can reasonably be occupied within 1 to 3 years, except when those recruitment clusters are established in areas that are somewhat removed from existing groups. The following process was used to identify and prioritize recruitment clusters for the next 5 years and to identify any management actions necessary to make these sites suitable for occupation:

1. Identified areas that could currently support artificial inserts (pine trees usually 15" diameter or greater at cavity height) with a reasonable amount of habitat improvement. This was accomplished using the stand inventory geodatabase and field reconnaissance. Efforts have been made to identify additional areas that would support the use of drilled cavities but not artificial inserts. No additional areas have been identified on Fort Jackson at this time.
2. From the areas identified from step 1, selected areas that were ideally spaced and could support enough foraging habitat using ArcGIS. Clusters were placed no closer than ¼ mile apart and had to be able to provide at least 75 acres of potentially suitable habitat.
3. Placed potential sites on a Geographic Information System (GIS) database to analyze placement and habitat potential, initially prioritizing these sites based on shorter term or longer term suitability. Shorter term clusters were those that could currently provide 75 acres of foraging habitat that meet Managed Stability or could meet Managed Stability with habitat management (i.e. thinning, mechanical midstory treatment, etc.). Longer term clusters were those that did not currently have sufficient pine stands old and large enough to meet Managed Stability.
4. Conducted foraging habitat analyses using the FWS Matrix tool to determine whether minimum habitat requirements were met. Minimum requirements will be discussed below.
5. Removed clusters from short term subset that could not currently support adequate foraging with habitat improvement due to either habitat conditions or size and shape of foraging partition with relation to other existing clusters or potential recruitment clusters.

6. Remaining short term clusters were prioritized based on distances to active clusters or other potential short term recruitment clusters, and the amount and condition of foraging habitat available.

In our initial planning effort, 111 sites were identified in steps 1-3 and assigned to longer term or shorter term status. Fifty of the sites were deemed suitable enough for cavities within the next 5 years, and 61 sites were considered possibly suitable in the longer term due to current habitat conditions and location. The 61 currently unsuitable sites were deemed unsuitable because they did not have enough foraging habitat to meet Managed Stability. In most cases these are sites that have a large proportion of young and/or small pines surrounding them. The fifty sites considered potentially suitable were then evaluated using foraging habitat analysis and proximity to other clusters to prioritize recruitment sites for the next 5 years.

This analysis was initially done using old inventory data that had been adapted for use with the RCW Foraging Matrix tool. Since then, these 111 sites were reevaluated using our latest forest inventory, to include hardwood midstory data and more detailed data on pine size distribution. From this analysis, it was clear that many of these sites would be unable to support a cluster without significant habitat improvement and time for young pines to age. Additionally, population trends on Fort Jackson indicate that cluster spacing greater than ¼ mile is often necessary to keep recruitment clusters from being captured. This is likely because current habitat conditions are such that it takes a greater area to provide enough foraging habitat for one group. Because of this we removed several clusters that were spaced within ¼ to ½ mile of another cluster. Removal of these reduced the number of long-term sites to 54 (Figures 1-7). However, we did not remove all clusters with this spacing. As recruitment clusters are planned and provisioned, we will continue to monitor RCW habitat use and cluster occupation and productivity. This information, along with site indices, will be used to develop site-specific habitat requirements for our population. As habitat develops over time, Fort Jackson may be able to support a higher cluster density.

Based on the analysis and the number of recruitment sites necessary to fulfill population growth potential, we prioritized sites that we knew were closer to fulfilling the necessary foraging requirements. Nine of original 50 sites thought to be suitable in the short-term have been created since the initial analysis, leaving 42 short-term sites (Figures 1-7). One of these clusters, 16D-A, had a relict tree occupied prior to the establishment of a recruitment cluster. Because this site was activated, we provisioned this site and 4 additional clusters in the area earlier than planned. Two of these clusters (16D-A and 16A-A) were occupied by breeding groups in 2012. The other 3 clusters are considered recruitment clusters (Figure 3). Both active clusters currently meet Managed Stability. Of the other 3 clusters, 2 meet Managed Stability (16C-A and 16D-B) and 1 does not (16A-B). Cluster 16A-B will meet Managed Stability with scheduled midstory treatment. Of the other 4 clusters already provisioned, 2 are active (32C-A and 32C-B) (Figure 4) and two are recruitment clusters (26C-B and 29B-A) (Figures 6 and 4, respectively). Clusters 26C-B and 32C-B currently meet Managed Stability; 32C-A can meet Managed Stability with a small amount of hardwood midstory control, and 29B-A

will meet Managed Stability with thinning of selected stands. Scheduled habitat improvements are detailed in Appendix F of the RCW ESMC.

Ten additional clusters have been identified that can meet Managed Stability guidelines prior to their creation. Because we have 8 recruitment clusters that meet Managed Stability available, we will not create any new recruitment clusters for FY13. We will instead focus management activity on the four recruitment clusters that do not meet Managed Stability and on active partitions that do not meet Managed Stability. We anticipate having completed enough habitat improvement to start installing new recruitment clusters in FY14. Scheduled habitat improvements are detailed in Appendix F. Two clusters will be installed in FY14 (22A-A and 22D-A) (Figure 3), 3 in FY15 (28B-A, 33B-B, and 29A-A) (Figures 3 and 4), 2 in FY16 (23B-A and 25A-C) (Figures 4 and 5), and up to 3 in FY17 (12D-A, 12G-A, and 12H-A) (Figure 2). Of these, 4 currently meet Managed Stability (23B-A, 28B-A, 29A-A, and 33B-B) and 6 do not (12D-A, 12G-A, 12H-A, 22A-A, 22D-A, and 25A-C). All new recruitment clusters will meet Managed Stability prior to being provisioned with cavities. The proposed cluster locations could change as new military missions are imposed, new scientific methods are developed, or as habitat changes occur. Cluster sites will be established in the vicinity of the mapped locations but may be adjusted because of changing habitat conditions due to natural or anthropogenic causes.

The RCW Recovery Plan, Second Revision (2003) (Recovery Plan) guidelines state that recruitment clusters should be placed no farther than 3.2 km (2 mi), and preferably no farther than 1.6 km (1 mi), from existing active clusters to facilitate occupation and to develop beneficial spatial arrangements and densities within the population. An exception to this is for developing new segments of populations. For proximity guidelines, these recommendations were followed with most of the new sites placed in new segments of the population. Potential sites that were the most highly aggregated were selected in these new segments to facilitate population expansion and stability.

The Recovery Plan also stipulates that the recovery foraging habitat goal is to provide Good Quality Foraging Habitat (GQFH) for each RCW group, consisting at least 120 acres of elements b, c, d, f, g, h, and i as defined in Section 8.I.A.2.a. Fort Jackson currently supports very little habitat that meets the Recovery Standard for GQFH, and waiting for sufficient habitat to develop would severely limit the population growth rate. In order to facilitate population growth on Fort Jackson, recruitment clusters will be established with associated foraging habitat that, at a minimum, meets Managed Stability, as described in the Recovery Plan, with the future potential to attain the Recovery Standard. These clusters and foraging habitat must be managed to reach the Recovery Standard over time and must be managed more intensely to insure continued occupation over time. Per Managed Stability Guidelines, each cluster must have a minimum of 3000 ft^2 of pine basal area including only pines ≥10 in dbh spread over a minimum of 75 acres. Only pine stands that include the following characteristics can be used to provide the necessary basal area of pines:

a. Stands that are at least 30 years old and older.

b. An average pine basal area of pines $\geq$ 25.4 cm (10 in) between 9.2 and 16.1 m^2/ha (40 and 70 ft^2/ac).

c. An average pine basal area of pines < 25.4 cm (10 in) less than 4.6 m^2/ha (20 ft^2/ac).

d. No hardwood midstory or if a hardwood midstory is present, it is sparse and less than 2.1 m (7 ft) in height.

e. Total stand basal area, including overstory hardwoods, less than 23.0 m^2/ha (80 ft^2/ac).

f. Recommendation that all land counted as foraging habitat be within 0.4 km (0.25 mi) of the cluster, and that any stand counted as foraging habitat be within 61 m (200 ft) of another foraging stand or the cluster itself.

g. Frequent prescribed burning of foraging habitat, especially during the growing season, is strongly recommended.

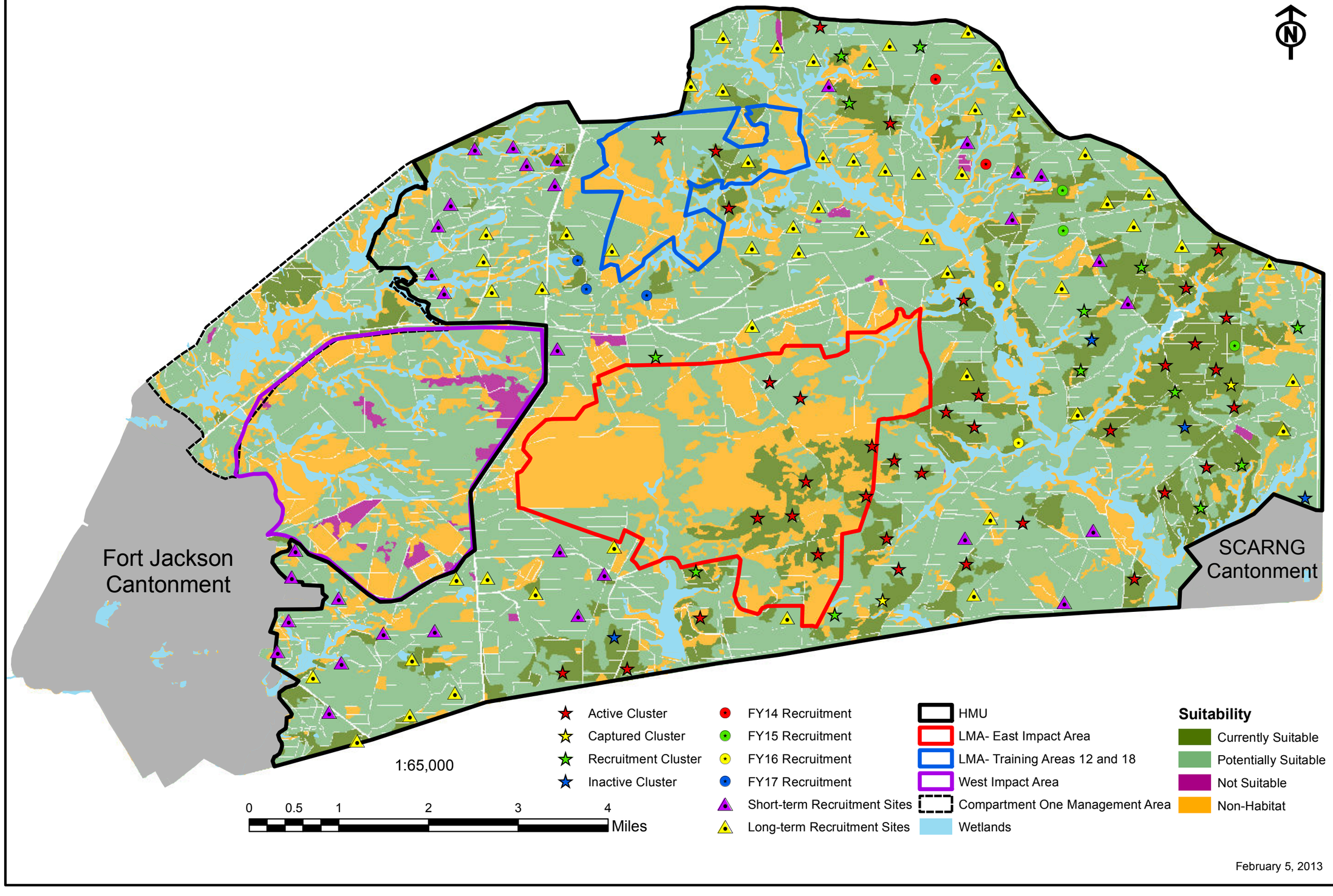
Please see the Recovery Plan for more information on the Standard for Managed Stability and the Recovery Standard.

Fort Jackson, will annually provision the number of recruitment clusters necessary to fulfill the 5-10% optimum growth rate of the population. The provisioning will be closely coordinated with the Forestry Branch to ensure that sites meet minimum standards as set forth in this plan, with particular regard to thinning and prescribed fire. Stands within active and recruitment RCW sites and foraging partitions will have priority for thinning and for prescribed fire. All efforts will be made to manage stands to the FWS Recovery Standard, understanding that management may be limited by mission requirements, manpower and funding. Population response, changing habitat conditions, changing mission requirements, funding and manpower may have significant impacts on the five year recruitment plan. The plan will be evaluated annually and adjusted as necessary to accommodate these changes and best promote population growth to achieve population goals.

Literature Cited

U.S. Fish & Wildlife Service. 2003. Recovery Plan for the Red-cockaded Woodpecker (Picoides borealis) Second Revision. Atlanta, GA. 88 pp.

Appendix D Figure 1. Fort Jackson RCW Recruitment Plan and Habitat Suitabillity



Appendix D Figure 2. Compartments 1 and 2 RCW Recruitment Plan and Habitat Suitability

Active Cluster
Captured Cluster
Recruitment Cluster
Inactive Cluster
FY14 Recruitment
FY15 Recruitment
FY16 Recruitment
FY17 Recruitment

Short-term Recruitment Sites
Long-term Recruitment Sites
HMU
LMA- East Impact Area
LMA- Training Areas 12 and 18
Compartment One Management Area
Compartment Boundary
West Impact Area
Wetlands

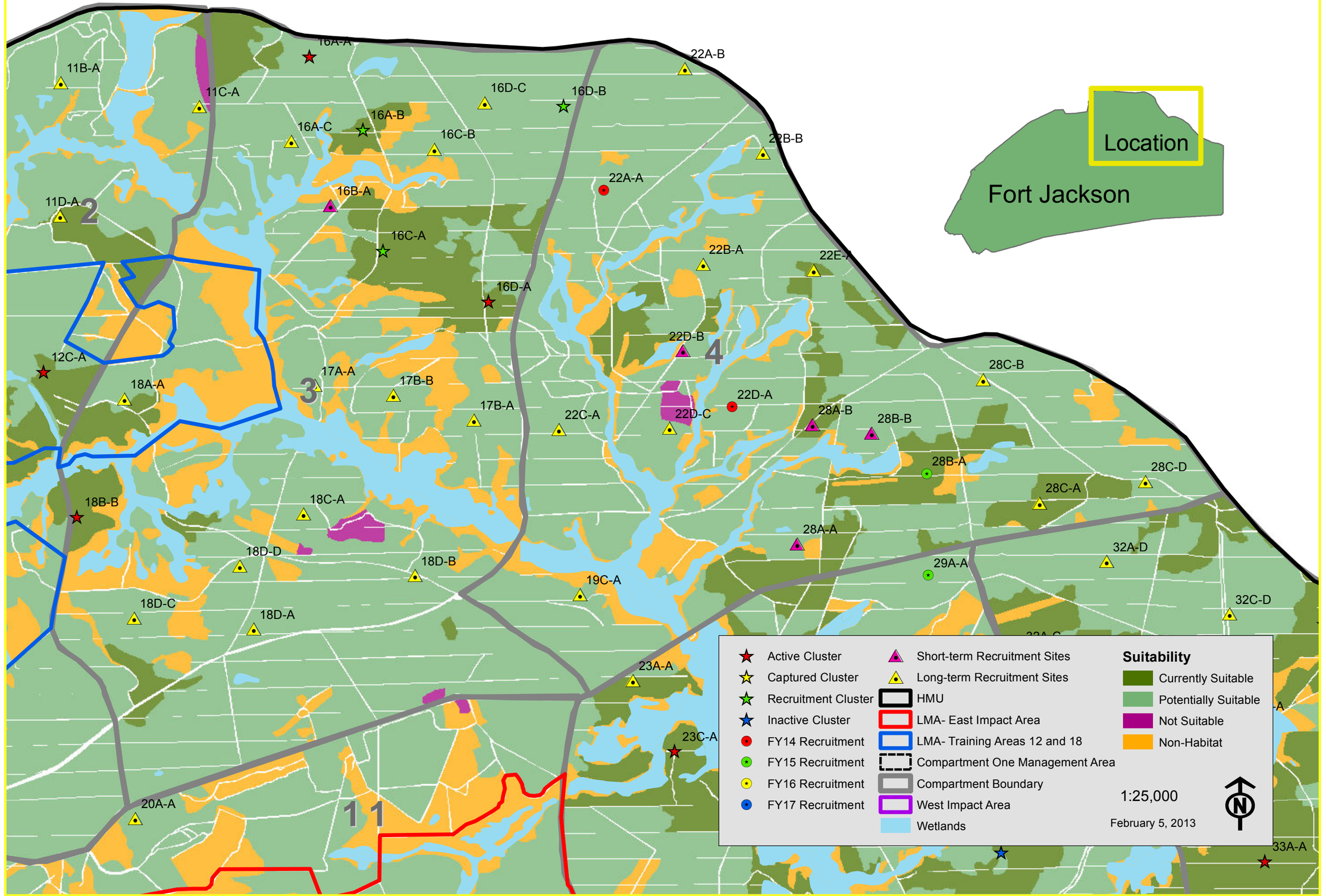
Suitability
Currently Suitable
Potentially Suitable
Not Suitable
Non-Habitat

1:25,000
February 5, 2013

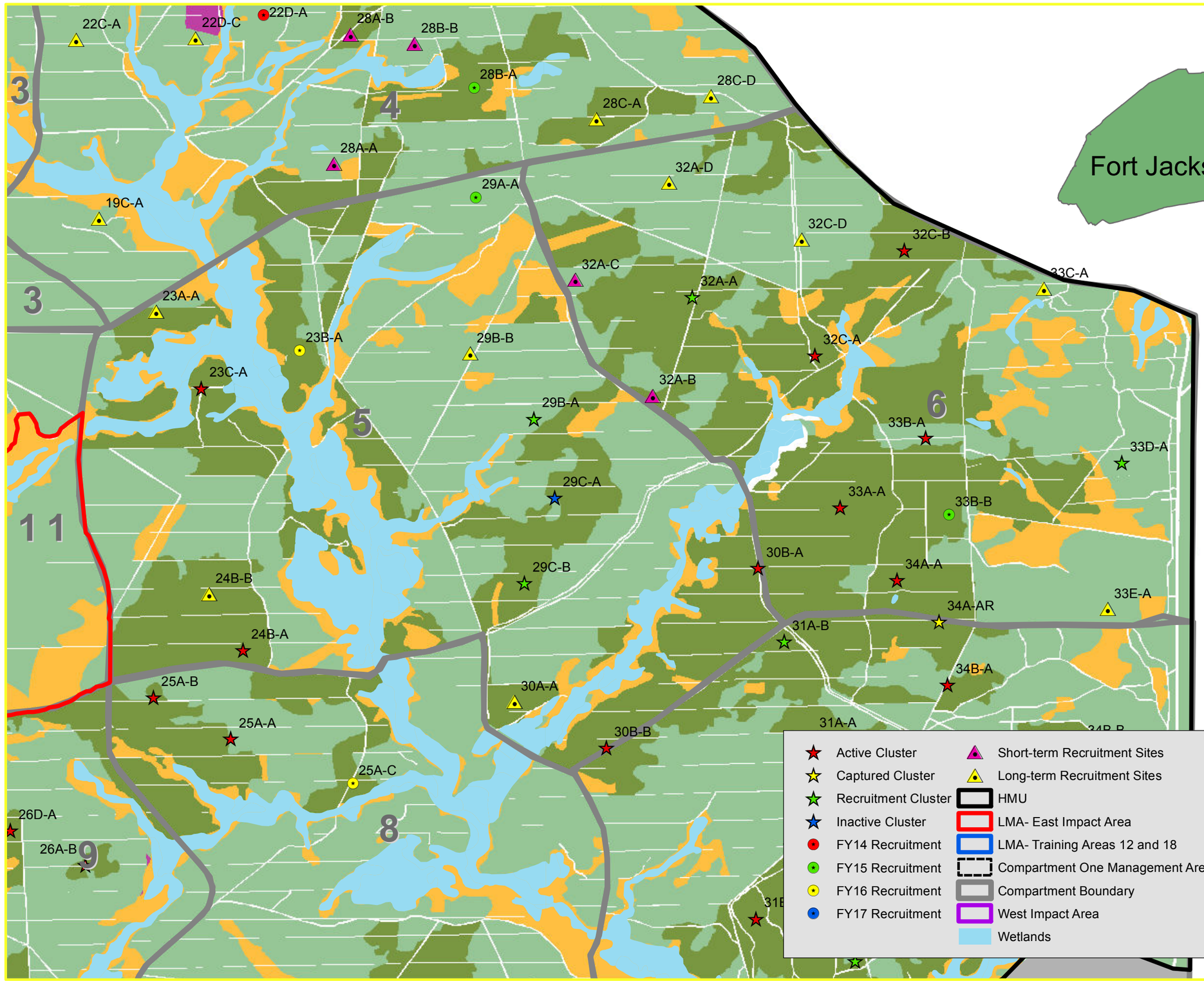
Location
Fort Jackson

11B-A
11C-A
11D-B
11D-A
12B-A
12C-A
18A-A
18B-B
18D-C
20A-A
4B-A
4C-D
4C-B
4C-A
4C-C
4A-B
4A-C
5A-B
12D-B
12D-C
3E-B
12D-A
3E-C
5B-B
5B-A
12G-A
3E-A
12H-A
1
2
3
12
11

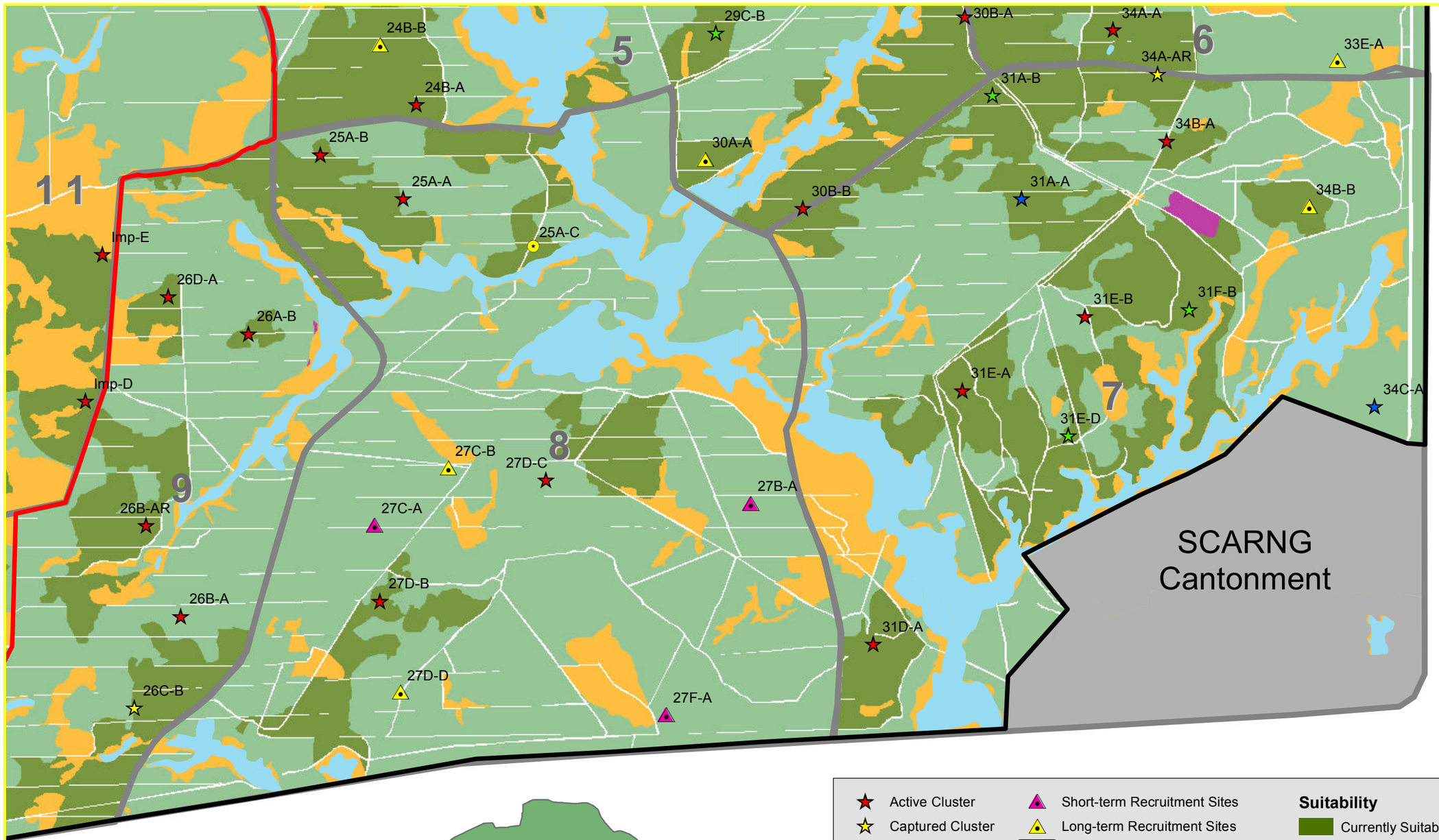
Appendix D Figure 3. Compartments 3 and 4 RCW Recruitment Plan and Habitat Suitabillity



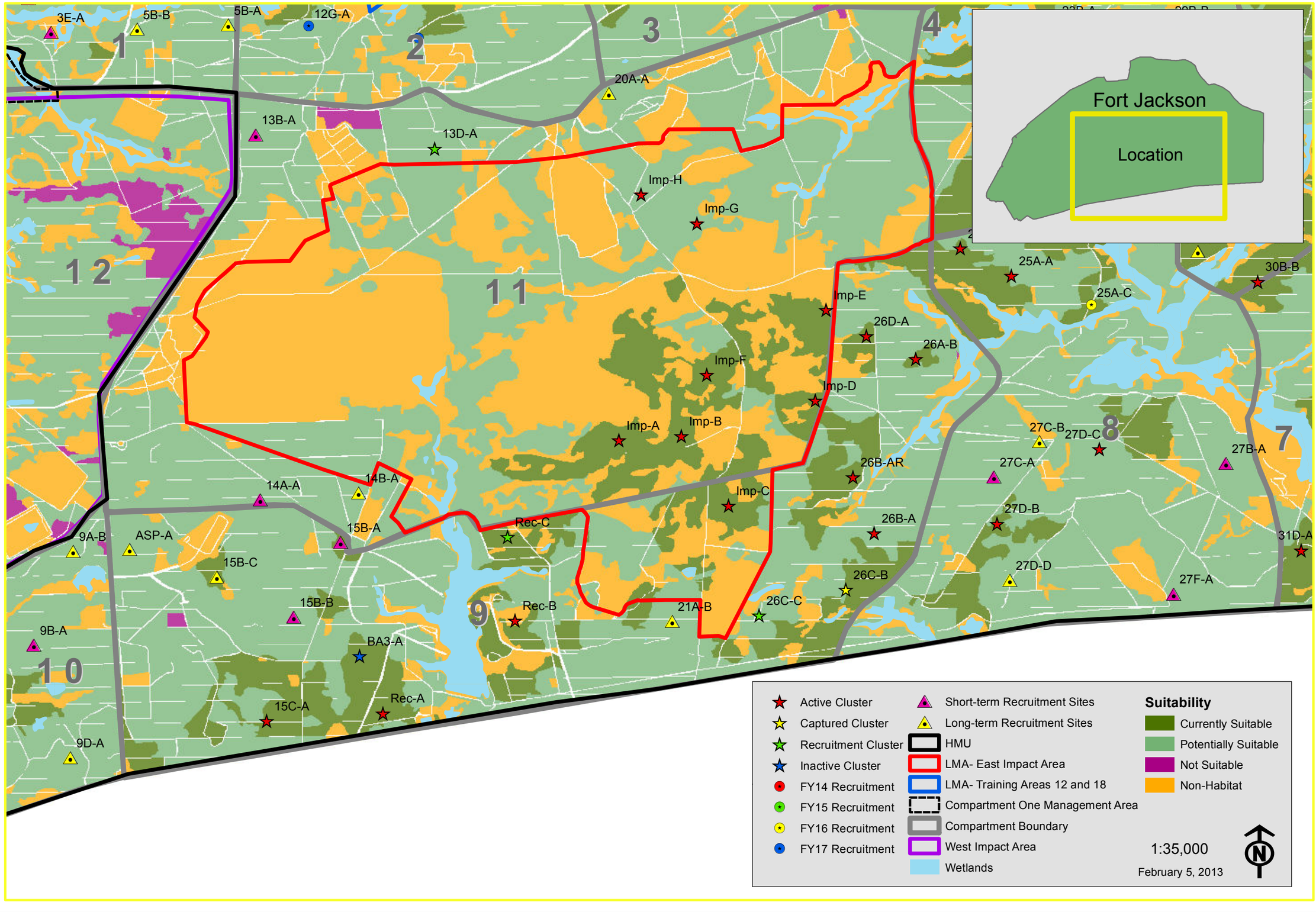
Appendix D Figure 4. Compartments 5 and 6 RCW Recruitment Plan and Habitat Suitabillity



Appendix D Figure 5. Compartments 7 and 8 RCW Recruitment Plan and Habitat Suitabillity



Appendix D Figure 6. Compartments 9 and 11 RCW Recruitment Plan and Habitat Suitabillity



Appendix D Figure 7. Compartment10 RCW Recruitment Plan and Habitat Suitabillity

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11
10
9
13
BA4-B
BA4-C
BA4-A
BA5-B
BA5-A
8B-A
8B-B
9B-D
9B-A
9B-C
9A-B
ASP-A
14A-A
14B-A
15B-A
15B-C
15B-B
15C-A
9D-A
9D-B
10B-A
10B-B
BA3-A
Rec-C
Rec-B
Rec-A
Fort Jackson
Location
Active Cluster
Captured Cluster
Recruitment Cluster
Inactive Cluster
FY14 Recruitment
FY15 Recruitment
FY16 Recruitment
FY17 Recruitment
Short-term Recruitment Sites
Long-term Recruitment Sites
HMU
LMA- East Impact Area
LMA- Training Areas 12 and 18
Compartment One Management Area
Compartment Boundary
West Impact Area
Wetlands
Suitability
Currently Suitable
Potentially Suitable
Not Suitable
Non-Habitat
1:25,000
February 5, 2013
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U.S. Fish and Wildlife Service
Biological Opinion

Inserted Here

United States Department of the Interior

FISH AND WILDLIFE SERVICE
176 Croghan Spur Road, Suite 200
Charleston, South Carolina 29407

November 20, 2013

Mr. Douglas M. Morrow
Chief, Wildlife Branch
Fort Jackson Army Training Base
Building 2563
Fort Jackson, SC 29207

Re: Biological Opinion for the Fort Jackson Endangered Species Management Component
Fort Jackson Army Training Base, South Carolina
FWS Log No. 2013-F-0207

Dear Mr. Morrow:

This document is the U.S. Fish and Wildlife Service's (Service) final biological opinion based on our review of the Endangered Species Management Component (U.S. Department of the Army 2013) and its impacts on the red-cockaded woodpecker (*Picoides borealis*), and the "Biological Assessment" for U.S. Army Fort Jackson, Richland County, South Carolina. Your request for formal consultation was received by this office on April 9, 2013. The Service reviewed the proposed action in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (ESA).

As this project is likely to adversely affect the federally endangered red-cockaded woodpecker (RCW), this biological opinion refers only to the potential effects on this species. Based on information available to the Service and the information contained in Fort Jackson's biological assessment (BA), the Service believes that the proposed action is not likely to adversely affect any other federally threatened or endangered species including the smooth coneflower (*Echinacea laevigata*), rough-leaved loosestrife (*Lysimachia asperulaefolia*), and Canby's dropwort (*Oxypolis canbyi*). Please contact the National Marine Fisheries Service for species under their jurisdiction. This biological opinion satisfies the section 7 consultation requirements of the ESA, but does not address requirements of other environmental laws. This biological opinion is based on information provided by the U.S. Army Garrison, Fort Jackson, the Endangered Species Management Component (ESMC), the BA, a review of the scientific literature, internal file data, site visits, phone calls (May 2010 – May 2013), and other published and unpublished sources of information. A complete administrative record of this consultation is on file in the Service's South Carolina Field Office located at 176 Croghan Spur Road, Suite 200, Charleston, South Carolina.

CONSULTATION HISTORY

May 18, 2010	The Service received from Fort Jackson a draft version of a revised ESMC for the RCW.
February 8, 2011	The Service provided Fort Jackson with comments on the draft ESMC for the RCW.
September 17, 2012	The Service received notification of significant pine mortality due to fire at Fort Jackson within an active RCW cluster and associated foraging partition. Included in the notification was an Analysis of RCW Cluster 15C-A Habitat Conditions Pre- and Post-Prescribed Fire (Analysis), which documented the conditions at the cluster before and after the fire. In addition, there was a breakdown of the impacts of the prescribed fire on the RCW cavity trees and foraging habitat. Proposed efforts to compensate for the pine mortality were attached.
October 18, 2013	The Service conducted a site visit with members of the Environmental Branch at Fort Jackson. The conditions at 15C-A were evaluated and potential compensation measures were discussed. Cavity trees in 15C-A were inspected for signs of stress, beetle infestation, and extent of tree mortality.
November 6, 2012	The Service responded to the Analysis with a letter to Fort Jackson recommending that future impacts due to fire be addressed through formal consultation via a Prescribed Fire Plan or an ESMC. The Service believes that formal consultation is justified under the circumstances in order to authorize incidental take to Fort Jackson for cavity trees, RCWs, and their offspring, in regards to prescribed fire. The Service recommended all prescribed fire be discontinued until such documentation has been established.
April 9, 2013	The Service received a transmittal letter along with the ESMC to initiate formal consultation pursuant to section 7 of the ESA. A revised BA and a Five-Year Management Plan were also included.
September 11, 2013	The Service submitted a draft biological opinion to Fort Jackson.
September 18, 2013	Fort Jackson responded to the Service regarding the draft biological opinion with suggested edits and recommendations. As such, the Service requested an extension to pursue the edits. Fort Jackson granted the request via phone and electronic mail.
September 30, 2013	The Service submitted another draft biological opinion having incorporated suggested edits from Fort Jackson.

November 1, 2013	The Service received an email from Fort Jackson stating that the BA forgot to address wildfires as a potential impact to RCWs.
November 7, 2013	The Service received a revised BA with excerpts regarding wildfires and their potential impacts at Fort Jackson.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Background

On May 18, 2010, the Service received from Fort Jackson a draft of the revised ESMC for the RCW. The ESMC is a component of the Fort Jackson Integrated Natural Resources Management Plan (INRMP), which is under modification. The Service was asked to provide comments to the draft ESMC, which was being revised to align and adopt conservation actions with the 2007 Management Guidelines for the RCW on Army Installation (Guidelines) and the Recovery Plan for the RCW, Second Revision 2003 (Recovery Plan). In addition, this revision considers new and/or more accurate data related to Fort Jackson's RCW population, the military's missions, and forest resources occurring on the installation. The Service provided comments on the draft ESMC to Fort Jackson on February 8, 2011.

This biological opinion addresses the effects of implementing the revised and updated 2001 ESMC. This comes as part of the 5-year review of the INRMP for Fort Jackson. The Sikes Act Improvement Amendment, Public Law (PL) 105-85, Div. B Title XXIX, Nov. 18, 1997, 111 Stat. 2017-2019, 2020-2022, require implementation and updating of the INRMP (Fiscal Years 2013 through 2017). The purpose of the INRMP is to integrate natural resources management programs at the Fort Jackson military installation with other land uses. The purpose of the ESMC is to present information on the RCW, define conservation goals, and outline a plan for management for the RCW and its habitat. Annual updates will continue to make the plan a working document.

On September 17, 2012, the Service received notification of significant pine mortality within an active RCW cluster and associated foraging partition at Fort Jackson. Attached was the Analysis, which documented the conditions at the cluster before and after the fire. The Analysis also provided suggestions to compensate for the pine mortality and loss of cavity trees. The Service conducted a site visit with members of the Environmental Division at Fort Jackson to evaluate the conditions at 15C-A and discuss potential compensation measures. The Service recommended the impacts due to the fire be addressed through formal consultation via a Prescribed Fire Plan or a revised ESMC. The Service received a transmittal letter on April 9, 2013, to initiate formal consultation pursuant to section 7 of the ESA to address the revised ESMC.

The objective of the Fort Jackson ESMC, based on 37 active clusters during 2012, is to: (1) present information on the RCW; (2) define conservation goals; and (3) outline a plan for management for the RCW and its habitat to achieve conservation goals. The ESMC will complement the Guidelines and Army Regulation 200-1, Chapter 4-3 (U.S. Department of the Army 2007). Procedures within the Guidelines are employed to determine management needs for the population, to designate areas within the Habitat Management Unit (HMU), and to recognize a RCW Installation Population Goal (IPG) specific to the training mission and environmental conditions.

The specific management goals in the ESMC cover a five-year period. This is generally considered short-term management. Management beyond five-years is not specific (except selection of recruitment clusters for additional years) and is considered long-term. Current goals for future years may be modified if needed. Changes to the ESMC considered significant will require consultation with the Service. A new ESMC will not be developed until required by a significant change in Fort Jackson's training mission, management techniques described are generally outdated, or a similar change renders the current ESMC obsolete.

The ESMC attempts to design a HMU, which will remain intact for the long-term. The objective is to establish an area where RCW habitat can be maintained indefinitely. This is necessary because long periods are needed to develop the RCW's habitat. Designing such an area with only short-term knowledge of land-use requirements is difficult. The size of the HMU is considered long-term but subject to change due to changing circumstances, changing mission requirements, or new scientific information. Significant changes to the HMU will require consultation with the Service.

Guidance

The Department of the Army guidance used to develop Fort Jackson's ESMC includes the Guidelines and Army Regulation (AR) 200-1 (U.S. Department of the Army 2007) (Guidelines). The ESMC was developed in cooperation with the Service and a draft copy of the ESMC was sent to them for comment. Comments on the draft ESMC provided by the Service are incorporated into the final version of the ESMC.

Location

Fort Jackson is located in central South Carolina in the state capitol of Columbia in Richland County. The installation is encompassed by two major interstates (I-20 and I-77) to the north and west, US Route 601 to the east, and Leesburg Road bordering the southern boundary. The installation is situated approximately 240 miles from Atlanta, Georgia and 115 miles from Charleston, South Carolina. The installation encompasses approximately 51,313 acres within the Sandhills ecoregion between the Coastal Plain and Piedmont eco-regions. There are more than 73 ranges, field-training sites, and 1,100 buildings at Fort Jackson. In addition, the South Carolina Army National Guard is permitted to use approximately 15,000 acres in the southeastern corner of Fort Jackson. Fort Jackson is responsible for managing natural resources for the entire installation, which has approximately 32,836 acres of current and potential RCW habitat.

Action Area

The RCW occurs within the Fort Jackson boundaries, but rarely occurs immediately outside the installation. The closest location of other RCW populations is approximately 25 miles east at Shaw Air Force Base in Sumter County, South Carolina. Therefore, the action area of this project is defined as all areas to be affected directly or indirectly by the proposed action (50 CFR 402.02), including the area within the boundaries of Fort Jackson.

Population

Based on the Recovery Plan, Fort Jackson is categorized as a Significant Support population in the Sandhills Recovery Unit, capable of supporting 126 clusters. However, according to the ESMC, based on the current and potential habitat in the HMU, Fort Jackson's Installation Population Goal (IPG) is 120 active clusters. The RCW population at Fort Jackson has grown from 24 active clusters in breeding season 2000 to 37 active clusters in 2012.

Approximately 32,836 acres of current and potential RCW habitat has been identified on Fort Jackson. This is more than 9,000 acres less than reported in the previous ESMC. According to the BA, this reduction of current and potential RCW habitat has been influenced by such things as cantonment area expansion, current and future mission requirements, removal of unsuitable habitat, the transfer of property for the Fort Jackson National Cemetery, and refinements to the geographic information system (GIS) database.

The HMU includes both the Limited Management Area (LMA) and Standard Density Area (SDMA) within the installation boundaries. The delineation of the HMU identified 32,836 acres of current or potential habitat at Fort Jackson. However, removal of acreage for cantonment area growth, removal of openings and stand types that are not considered potentially suitable habitat, removal of stands in the LMA, removal of 600 acres for the Fort Jackson National Cemetery have all reduced the acreage of available habitat in the HMU. For example, 2,368 acres were removed from the Forest Compartment One due to significant wetlands, which fragment and isolate the potential habitat, and the difficulty of using prescribed fire in this area due to smoke management concerns. Mission requirements, totaling 8,787 acres, include new ranges, Forward Operating Bases, and helicopter landing zones. Approximately 1,214 acres are being removed from lands identified in 2001 as HMU for cantonment expansion. Nearly 3,000 acres were removed from the LMA due to unsuitable habitat types (scrub oak stands) and mission requirements. Nevertheless, 1,185 acres of potential habitat, once a large area designated for training, has been added back to the HMU.

As a result of these changes, the HMU currently contains approximately 26,645 acres. The LMA and the SDMA contain approximately 4,485 acres and approximately 22,160 acres, respectively. All areas within the SDMA will be managed according to the Guidelines and the Recovery Plan. The Recovery Plan recommends Federal lands be managed at the Recovery Standard (RS), using ecosystem management to achieve Good Quality Foraging Habitat (GQFH). GQFH is defined by the Recovery Plan as multi-aged pines, sparse hardwood, midstory, and a groundcover of bunchgrass and forbs. Within the LMA, the presence of Unexploded Ordinance (UXO) limits

the ability of natural resource personnel to perform specific activities which would help maintain pine or pine-hardwood forest (i.e. planting and thinning pines), or improve habitat conditions for the RCW (e.g. midstory control). Therefore, the primary management actions to be performed in the LMA include; population monitoring, limited protection of cavity trees from fire damage, and the construction of artificial cavities.

RCW Management Guidelines and Prescriptions

General Habitat Management Unit Management Practices

Fort Jackson's long-term goal for habitat management within the HMU is to provide optimum foraging and nesting habitat that is contiguous with, and as close as possible, to each cluster. All habitat management practices in the SDMA will be developed and implemented for the purpose of establishing GQFH as specified in the Recovery Plan. Currently most of Fort Jackson's SDMA does not meet these guidelines and will need significant restoration to meet these goals. Some of the major deficiencies are related to the age of the forest, the density of small pines, and hardwood midstory. According to the ESMC, these issues will be addressed first in existing clusters then throughout the SDMA. Within the LMA, management activities are limited to prescribed fire and cavity maintenance. Therefore, Fort Jackson may not be able to establish GQFH throughout the LMA.

The SDMA will encompass all clusters, areas designated for recruitment, and adequate foraging areas. Clusters that have been documented as continuously inactive for a period of five consecutive years or more may be deleted from RCW management requirements. Designated recruitment clusters that have not been occupied for a period of five consecutive years may also be deleted from the HMU. Fort Jackson will determine availability of and manage for foraging habitat and clusters in accordance with guidelines established in the Recovery Plan, i.e., the RS. All previous standards, guidelines, and practices in the 2001 ESMP based on the 1985 RCW Recovery Plan and the Service's Blue Book are no longer applicable.

Due to the biological needs of the RCW, clusters and the surrounding cluster stand require a more intense level of management than other areas within the HMU. Maintenance priority will be given to active clusters over both inactive and recruitment clusters within the HMU. Fort Jackson will manage habitat within active and recruitment clusters in accordance with guidelines established in the Recovery Plan and the Guidelines. Cluster management will include the protection and retention of old pines for cavities, maintenance of sufficient suitable cavities, and restoration and maintenance of suitable habitat structure and quality within the cluster (minimum of 10 acres).

According to the ESMC, a minimum of four suitable cavities, or at least the number of cavities equal to the number of birds that remain after all young have fledged, will be maintained. A minimum of four suitable cavities will be maintained in all recruitment clusters. Active clusters and recruitment clusters will be kept clear of dense midstory. An open, park like pine stand of at least 10 acres in size will be maintained. All hardwood midstory within 50 feet of cavity trees will be removed. Selected hardwoods beyond 50 feet may be retained to benefit species other than the RCW. All foraging stands should consist of no or sparse hardwood maintained below 7 feet in height. Canopy hardwoods will be limited to no more than 10 square feet (ft^2) of basal

area (BA). Pines which are large enough to provide foraging habitat or large/old enough for cavity trees within 50 feet of an existing cavity tree will only be removed if deemed necessary by a Fort Jackson RCW biologist.

Across the installation at Fort Jackson, there are relict cavity trees that are no longer suitable for management. Examples include relict trees containing cavities that are no longer suitable in managed habitat and relict trees located in areas that will not be managed as RCW habitat (e.g., upland or bottomland hardwood areas, mission required areas). Multiple conditions render cavities unsuitable. Most commonly, these cavities have greatly enlarged entrances or a rotted base and are no longer acceptable for use by RCWs. Protective buffers around relict cavity trees may be removed if they are deemed unmanageable; however, the trees will remain on the landscape and will not be cut. Natural resources personnel trained in RCW management will determine those cavity trees for which suitable cavities can no longer be maintained or provided.

While other areas within the HMU do not require the same level of intense management as clusters and recruitment clusters, a prescribed burning program sufficient to control hardwood growth, eliminate dense midstory, and reduce fuel levels available to wildfires should maintain the quality of foraging stands. Prescribed burning is normally the most effective means of midstory control and is recommended as the best means of maintaining a healthy ecosystem. However, current habitat conditions on many areas of the HMU will require other restoration techniques in order to establish minimally suitable habitat. Once habitat conditions have improved, prescribed fire will be used to maintain and improve the habitat with the goal of reaching GQFH as described in the Recovery Plan.

Prescribed burning will be conducted at least every three years in suitable longleaf, loblolly, slash, and shortleaf pine stands. The age of the stand when fire will be introduced will depend on the species of pine and site conditions. Qualified personnel, in accordance with applicable Federal, State, and local air quality laws and regulations, will conduct the burning. Burn prescriptions will be prepared for each burn unit based on habitat evaluations for each individual RCW group. The prescriptions will include parameters necessary to reach the burn objective and will include at a minimum; season of burn, fuel moisture, wind speed, relative humidity, and acceptable drought indices. Burning will normally be conducted in the growing season since the full benefits of fire are not achieved from non-growing season burns. Non-growing season burns will be used to reduce high fuel loads before growing season burns are conducted. Fire plows will be used in clusters only during emergencies. Aerial ignition will be used for prescribed burning when feasible. Cavity trees will be protected from fire damage during prescribed burning as described below.

Fort Jackson will use measures to minimize the damage of RCW nesting and foraging habitat associated with the application of prescribed fire and will include at a minimum the following:

- Protect individual cavity trees by reducing fuel loads at the base of the tree by raking, mowing, and wetting cavity tree as needed.
- Reduce high fuel loads utilizing dormant season fires before application of growing season fires.
- Adequately monitor cavity trees and foraging habitat post-fire to identify unusual stress or mortality of pines.

- Provision cavity inserts within 48 hours to replace cavities lost in the fire.

Alternatives to prescribed burning for hardwood midstory control, control of dense pine natural regeneration, and habitat restoration include the following:

- Mechanical Mowers - These will be either tractor-drawn mowers or tracked or rubber-tired cutters with front or rear mounted rotary drum severe duty flail cutter heads or fixed tooth mulching/cutter heads.
- Manual - Hand operated chainsaws and gas-powered line trimmers with saw blades.
- Chemical - Registered herbicides applied by broadcast and single stem techniques.

These methods will be used at Fort Jackson when prescribed burning is not feasible, is insufficient to control a well advanced hardwood midstory, and in combination with prescribed burning. All three alternatives above may be used in both nesting and foraging habitat. Application of herbicides will be consistent with applicable Federal, State, and local laws and regulations.

Timber harvesting and habitat maintenance activities, with the exception of prescribed burning activities and emergency construction of artificial cavities, will not be conducted in active clusters during the nesting season, occurring from April 1 through July 31. If a biologist experienced in RCW management practices determines that habitat maintenance activities are not likely to adversely affect nesting activities, they may be conducted after coordination with the Service.

Military training involves the use of ammunition, explosives, smoke grenades, pyrotechnics, and other items that can serve as sources of ignition. Wildfires are often unintentionally ignited during the course of military training. To reduce the number of human-induced wildfires, Fort Jackson implements a Forest Fire Danger Rating system where during times of high fire danger certain military operations and the use of incendiary devices are restricted or suspended.

RCW conservation has been included in Fort Jackson's Integrated Training Area Management program. Close coordination between the Directorate of Plans, Training, Mobilization and Security (DPTMS) and Directorate of Public Works (DPW) ensures that field training does not adversely affect the RCW. Through a program conducted by the DPW, a member of each military unit (usually at the company level) is educated about a wide variety of environmental subjects, including conservation of endangered species. This unit member, called the Environmental Compliance Officer, is charged with educating other members of the unit. Specific civilian employees are also educated through this program. In addition, GIS is used to record natural resource baseline information required for management of the installation's training land. The GIS database is used in the development of RCW conservation programs.

Recruitment Clusters Selection

The recommended number of recruitment clusters to achieve population growth rates of 5-10 % per year is a constant supply equal to 10 % of total active clusters in the population (Recovery Plan). Based on this recommendation and a minimally desired average annual growth of 5 % per

year, Fort Jackson will annually provide recruitment clusters to equal at least 10 % of the total number of active clusters. A total of 21 recruitment clusters will be required during 2013-2017 period based on 5% growth. Currently there are 12 suitable recruitment clusters on the landscape, so an additional nine clusters may be provisioned by 2017. Per Service guidelines, recruitment clusters will not be established at a rate higher than can reasonably be occupied within one to three years, except when those recruitment clusters are established in areas that are somewhat removed from existing groups.

Timber Harvesting and Management in the HMU

According to the ESMC, the goal of timber management on Fort Jackson is to maintain and increase the quality and quantity of RCW habitat. All silvicultural treatments in the HMU will be developed and implemented for the purpose of establishing GQFH as specified in the Recovery Plan. The Guidelines direct installations to follow the guidelines presented in Sections 8.I and 8.J of the Recovery Plan. In accordance with these guidelines, silvicultural practices will utilize ecosystem management to produce GQFH throughout the HMU. All habitat within the HMU will be managed with the long-term goal of meeting all of the RS criteria for GQFH.

Due to historical land-use practices, much of the forest on Fort Jackson is not currently suitable RCW habitat. First, the existing pine and pine-hardwood stands on Fort Jackson are young. Approximately 5,700 acres of the SDMA are aged less than 30 years and are too young to be considered forage. Almost 10,000 acres are between 30 and 59 years and may be considered forage but may not contain trees suitable for cavities. Only a little over 5,000 acres are aged at 60 or over. Stands greater than 80 years old cover only about 1,100 acres and there are only 10 stands aged over 100 covering only 249 acres. Contributing to the young age structure of the forest is that over 6,000 acres have been converted from off-site slash pine to longleaf pine and these stands have not reached minimum forage age. Small patches of old longleaf pine do exist in many of the younger stands. Most of these patches were evaluated in the development of a long-term recruitment plan and considered for future recruitment clusters. The second factor contributing to the lack of suitable habitat on Fort Jackson is that many of the stands in the SDMA have not been thinned in the past and contain high BA of small pines. The primary goal of timber thinning on Fort Jackson is to increase the amount of suitable foraging habitat in the HMU, with priority placed on stands within active foraging partitions.

Another concern at Fort Jackson is the young and/or high BA stands, many older stands outside of the East Impact Area (EIA) that would otherwise be suitable, have experienced a period of fire exclusion. The lack of fire in these stands has often resulted in a high and dense hardwood midstory, rendering these stands unsuitable for both cluster and foraging habitat. While fire has been reintroduced to many areas across Fort Jackson, prescriptive application of fire will have to continue in order to make these stands suitable for RCW occupation. Additionally, many stands require chemical or mechanical restoration before fire will be sufficient to improve stand quality. A preliminary analysis using our latest forest inventory and the RCW Matrix tool indicated that more than half of our HMU did not meet Managed Stability (MS) guidelines for hardwood midstory. Recent management practices have increased the quality and quantity of habitat for the RCW. A continued aggressive program of habitat improvement will further increase the quality and quantity of forage habitat and develop the necessary habitat structure to support the IPG. The following practices will be implemented or continued at Fort Jackson:

(1) Thinning will be conducted in existing pine and pine-hardwood stands to maintain stand vigor and proper BA for RCW cluster and foraging habitat in occupied and unoccupied habitat for future recruitment.
(2) Off-site pines (slash & loblolly) in the HMU will be converted to longleaf pine.
(3) Scrub oak stands found outside of the LMA will be converted to the pine species which historically grew on-site. Longleaf sites will receive priority. The majority of the conversion has already taken place.
(4) As noted previously, growing season burning and herbicide applications will be conducted in suitable stands.

Silvicultural treatments in the next five years will be focused on thinning and conversion of off-site species and scrub oak stands to longleaf pine. We do not anticipate regenerating on-site pine and pine hardwood stands. Forest management will be consistent with the conservation and restoration of RCW habitat throughout the HMU.

Thinning

As stated above, much of the HMU is currently unsuitable due to high BA of small pines. Thinning operations planned for the next five years will be directed at reducing BA of small pines in overstocked stands, especially those that are in half-mile foraging partitions for active and recruitment clusters. Areas were prioritized based on the greatest need in order to bring foraging partitions up to at least 75 acres of minimally suitable foraging habitat. However, implementation of the thinning plan will include other stands that are in the target or adjacent management unit. All thinning is targeted at either rendering the stand suitable under MS guidelines, or moving the stand toward GQFH. The overall goal is to bring all foraging partitions up to the standard for MS in the short term and to GQFH in the long-term.

Thinnings are designed to establish suitable RCW habitat in overstocked unsuitable stands and keep favorable trees growing by removing less favorable neighboring trees. Competition from neighboring trees causes reduced tree vigor, making individuals more susceptible to death from drought, insects, and disease (Oliver and Larson 1990, as cited by U.S. Forest Service 1993).

Preferentially leaving trees important to RCWs during thinning and harvests greatly benefits the species and the ecosystem. Important trees to leave include old and very old pines (relict and remnant pines and flat tops), potential cavity tress (pines over 60 years in age), and pines scarred by turpentine harvest or lightning. The pine species which is best adapted to a particular site will be favored when thinning stands. Healthy relicts will be left standing indefinitely. Other than the priorities listed above, leave trees will include the healthiest, best formed, dominant and co-dominant trees well distributed and spaced. Trees that are diseased, suppressed, and have poor vigor will be removed unless needed to maintain the main canopy. Generally, thinning will result in the development of well-stocked stands, which consist of well formed, healthy trees, while maintaining relicts for potential cavity trees. Continued thinning over time should reduce the risk of southern pine beetle (SPB) infestation.

The target BA of pine within the HMU is 40 to 80 ft^2 per acre following the guidelines for GQFH when possible. In stands where sufficient old and large pines are not available to produce

the structure for GQFH, the standard for MS will be followed. For more information on these Guidelines please see the Recovery Plan or the Guidelines.

The order of priority for thinning stands will be determined by the Biologist and the Forester based on active clusters, forage for active clusters, recruitment clusters; forage for recruitment clusters, and other stands within the HMU. Stands to be thinned will be grouped into specific sale areas and the sale areas will be prioritized. This may sometimes result in lower priority stands being thinned before higher priority stands because they are in the current sale area. However, higher priority stands within a sale area will almost always be thinned before the lower priority stands. In addition, because we have a limited ability to sell metal contaminated timber, lower priority thinning may have to take place before the higher priorities are completed. This would occur if much of the higher priority thinning require removal of metal contaminated timber.

Restoration

Restoration involves the re-establishment of the pine species adapted to a particular site after the off-site pine or scrub oak has been removed. Historically, the most commonly replaced pine species was longleaf because of its relatively slow growth and problems with its regeneration. The tree species to be restored on each site will depend on site conditions. The majority of restoration areas are best suited for longleaf pine, including some sites currently supporting loblolly pine (which is considered off-site). Those few areas in slash pine or scrub oak, which are adjacent to wetlands with a correspondingly high site index, will be converted to loblolly pine. There are a few slash stands which appear to be healthy and growing vigorously. These few slash stands will be managed until the stand can no longer maintain itself, or until the decision is made to convert the stand to an on-site pine species. Fort Jackson's priority is to convert appropriate sites to longleaf pine.

Generally, 30-40 ft^2 of BA per acre of evenly distributed longleaf pine must be present to re-establish this species via natural regeneration (seeding). Some stands with off-site pine and inadequate residual longleaf pine stocking for natural longleaf regeneration will be converted by removing merchantable and un-merchantable off-site pine in one cutting, preparing the site (prescribe burning, chemical and/or mechanical methods to include drum-chopping), and planting longleaf pine. Islands of longleaf pine within the conversion site containing 30 ft^2 of BA per acre or more will be retained. Rarely a stand will need to be retained in order to provide foraging habitat for an existing RCW cluster, or to maintain habitat contiguity for future recruitment clusters while adjacent longleaf plantations reach the necessary size and age for suitable forage. Some of these stands may be thinned to 40 ft^2 BA per acre and under-planted with longleaf pine. The remaining off-site pine will be removed once the longleaf reach the appropriate age and/or size to maintain habitat contiguity.

Existing longleaf pine regeneration within a restoration site will be conserved by requiring timber harvesting contractors to: (1) avoid seedling/sapling concentrations over 1/2 acre; and (2) requesting they avoid those areas between 1/4 and 1/2 acre. Conserving all longleaf pine natural regeneration within the harvest area is impractical during conversions. This is due to damage caused by equipment during harvest and site preparation.

Within conversion areas all healthy longleaf will be marked and retained unless the BA is greater than 40 ft^2 per acre. In areas of higher BA, the longleaf patches will be thinned to meet RCW foraging habitat guidelines.

According to the ESMC, many restoration sites contain small upland hardwood inclusions. Examples of species present include southern red oak (Quercus falcata), red oak (Q. rubra), mockernut hickory (Carya tomentosa), and pignut hickory (C. glabra). Generally, these small inclusions will be protected and not harvested during site conversions. Stands which historically supported hardwood stands (including mixed stands dominated by quality upland hardwoods), both in upland and bottomland areas, will not be converted to pines unless a biologist determines this is needed to support a RCW cluster or recruitment cluster. These hardwood stands are not being considered part of the HMU and continuing to manage them as hardwoods will not change the RCW population goal mentioned above.

Forest Pest and Disease Management

Trees within the Fort Jackson HMU, excluding off-limits areas such as UXO areas, affected by pine beetles (e.g., Ips and/or SPB) infestation or infectious tree diseases (leptographium sp.) will be evaluated for treatment. Treatments for beetles may include the use of pheromones, cutting and leaving, or cutting and removing infected trees. The installation forester will determine the appropriate treatment for each site infected with pine beetles. The forester will consult with an RCW biologist to determine the appropriate treatment, when those sites occur within the HMU. Pines will be left standing around active clusters whenever forage is limited and the infestation is not expected to spread. The expertise of the U.S. Forest Service, the South Carolina Forestry Commission, or other disease specialists/entomologists will be sought for control of diseases or pests, including pine beetles, when needed. A buffer of uninfected trees may be removed if deemed necessary to stem the spread of the infectious agents/pests. Cavity trees will be cut only with the approval of the Service. Similarly, RCW foraging habitat analysis will be conducted prior to cutting treatments that remove 10-inch diameter at breast height (DBH) or greater pine in active clusters and foraging partitions, and approved by the Service. Prior to cutting an infected cavity tree, a suitable replacement cavity tree will be identified and provisioned.

Forest Management of Metal Contaminated Stands

Tree contamination with bullets and shrapnel has occurred at Fort Jackson. Most of the installation has been a weapons range at some time in the past 60 years. The current location, level, and type of metal contamination have not been precisely defined. Metal contamination affects silvicultural management by limiting the commercial value of the timber resource. Timber buyers are reluctant to bid on areas, which have metal contamination. For the timber buyer to bid on metal contaminated timber the contamination cannot contain any shrapnel or steel-jacketed bullets, such as .50 caliber bullets. It is possible to sell metal contaminated stands, including those with steel-jacketed bullets or shrapnel, which contain trees that are appropriate for use as telephone poles and/or pilings. Stands containing metal contamination may have no commercial value, depending on the level or type of metal contamination. Stands with commercial value will continue to be actively managed.

Most of the stands that are judged to have no commercial value are generally at least 50 years old. This represents the period when ranges ceased firing outside of the two current impact areas. Alternatives for managing these type stands include removal of stems by paying a contractor to cut and remove, or selective herbicide injection.

Should management of metal contaminated stands prove to be impractical, these stands may be removed from the HMU and the population goal changed accordingly. Consultation with the Service will be initiated before the population goal is adjusted.

Pine Straw Harvesting

During the next five years, Fort Jackson will suspend the commercial harvest of pine straw within the HMU.

Restoration and Construction of Cavities

Restoration of Cavities

Entrances of active and inactive RCW cavities (including starts), both naturally and artificially constructed found to be in poor condition during annual inspections will be repaired whenever feasible to prolong cavity use. Cavity restrictors may be installed on enlarged RCW cavity entrance holes (greater than two inches in diameter) to optimize the availability of suitable cavities. Restrictors may also be installed to protect RCW cavity entrances that have not been enlarged where suitable cavities are limited, the threat of enlargement is great, or when another species that can be excluded by the use of a restrictor. Priorities for the installation of restrictors in descending order will be: active single tree clusters, single bird clusters, clusters with less than four suitable cavities, and other clusters. Restrictors will not be placed on the entrances of cavities no longer being managed.

Techniques for installation of restrictors will be based on Carter et al. (1989). An opening size of 1.75 inches (44 mm) will be used normally. Reaction of RCWs to restrictors will be monitored when they are placed on the entrance of active cavities. Monitoring will be conducted the same day a restrictor is placed around the entrance of an active cavity. If avian competitors larger than the RCW continue to use the cavities, restrictors with 1.5-inch (38 mm) openings will be used and closely monitored. Adjustments to the positioning of the restrictors will be made to ensure competitors are excluded and RCW access is unencumbered.

Additional measures to maintain the suitability of a cavity at Fort Jackson will be used on inactive cavity trees if these are deemed likely to benefit the RCW. For example, in those few instances when a usable cavity has two entrances and one has been enlarged beyond repair, the enlarged entrance will be closed via a metal plate covered with wood filler. The effect of these measures on the RCW will be monitored if the tree is re-activated.

Construction of Cavities

Artificial cavities will be constructed in areas designated for recruitment or translocation and in clusters where the number of suitable cavities is limiting. The objective is to provide at least

four suitable cavities per active or recruitment cluster. Priorities for installation of artificial cavities in descending order will be: active clusters with a single cavity tree, active clusters with insufficient cavities to support a potential breeding group, and recruitment clusters in the order specified. In all active clusters and recruitment clusters, a minimum of four suitable cavities will be maintained. In instances where group size is greater than four, additional cavities may be provided to ensure that all adults in the cluster have access to a cavity.

Cavity construction will follow guidelines presented in Section 8.E. of the Recovery Plan. Cavities will be provisioned by either drilling or insert techniques and accomplished by fully trained personnel. The Copeyon-drilled method will be used for drilled cavities (Copeyon 1990) and Allen's (1991) technique will be used to install inserts. Details describing drilling and insert techniques are found in the Recovery Plan.

Inserts, or restrictors used to protect them, may be modified to prevent competitors from destroying or modifying the cavities or their entrances. Examples of such actions include:

(1) Gluing a piece of PVC pipe in the entrance of inserts (Richardson and Bradford 1996/1997).

(2) Modify the full-face plate restrictor to cover beyond the edges of the insert instead of just the front, or use expanded metal to cover beyond the edges of the insert. The sides of the restrictor or expanded metal would be nailed to the tree. Red-bellied Woodpeckers and Pileated Woodpeckers sometimes create holes in inserts from the side of the box, where the tree and the side of the box meet. A restrictor or expanded metal enlarged to cover this gap would prevent this from happening. The restrictors will be adjusted to make them small enough to permit face plate construction by the RCW but large enough to prevent other species from entering inserts from the side.

Fort Jackson will consult with the Service for approval for any modification to drilled cavities or inserts beyond those discussed in the Recovery Plan.

Measures to Reduce RCW Predation and Competition for RCW Cavities

In small RCW populations such as Fort Jackson's, it is important to use appropriate management techniques to ensure that predation of adults and offspring, including eggs, is minimized. Techniques that reduce competition for cavities will also provide greater potential for population expansion. However, Recovery Plan guidelines state that methods of predator control should be used only in populations of less than 30 PBGs. Further, it is stated that control methods should be non-lethal if possible. Squirrel excluder devices and snake excluder devices have both been used at Fort Jackson with varying rates of success. These management tools will no longer be used on Fort Jackson since the population has exceeded 30 PBGs.

Where possible, the retention and protection of snags will be used to minimize competition for RCW cavities. Occasionally snags present a hazard when adjacent to firebreaks or roads and may be removed. Nest boxes may be used on Fort Jackson in or adjacent to active clusters and provisioned recruitment clusters in an attempt to reduce competition for RCW cavities. Other techniques designed to reduce competition for cavities or predation on the RCW may be used.

Appropriate monitoring will be performed to ensure these do not adversely affect the RCW. Consultation with the Service is required prior to their use.

Protection of Clusters

Markings

In order to protect clusters and individual cavity trees, they must be made easily recognizable by all personnel (Soldiers, natural resources personnel, timber harvesters, mid-story removal contractors, hunters, etc.) using the area. Therefore, all protected cavity trees on Fort Jackson (including those with starts) in active and recruitment clusters, regardless of location, will be marked with two white bands no more than approximately four inches wide and eight inches apart. The bands will be centered approximately four to six feet from the base of the tree. A uniquely numbered small metal tag will be affixed to the cavity tree for identification purposes.

According to the ESMC, there are many inactive relict cavity trees scattered across the landscape on Fort Jackson. These trees will be marked as described in the preceding paragraph except light green paint will be used instead of white. This identifies the trees to all personnel using the area as historically used RCW cavity trees that are not to be damaged in any way. It also shows that these trees differ from the white banded ones, as no training restriction buffers are placed around them. Typically, trees marked with two light green bands are those that have cavity entrances that are too large for restrictors, cavities that are no longer useable, or cavity trees that have been inactive for five or more years.

Buffers

A buffer 200 feet around each cavity tree in active clusters and provisioned recruitment clusters will be marked with warning signs posted at reasonable intervals facing to the outside of the buffer and along roads, trails, firebreaks, and other likely entry points into the buffer. Where cavity trees are within 400 feet of each other, the marked buffer will overlap and surround the aggregate of trees. Where cavity trees are separated by more than 400 feet, separate marked buffers will result. Signs posted at the marked buffer will be constructed of durable material, ten inches square (oriented as a diamond), and white in color. A RCW graphic and the lettering "Endangered Species Site" and "Red-cockaded Woodpecker" will be printed in black. The lettering "Do Not Disturb" and "Restricted Activity" will be printed in red. All lettering will be 3/8 inches in height.

Buffer markings may be removed around cavity trees which will not be managed that occur in active clusters and provisioned recruitment clusters (e.g., trees with cavity entrances that are too large for restrictors, cavities that are no longer useable, or cavity trees within active clusters that have been inactive for 5 or more years). Generally, removal of the buffer will depend on the trees location relative to other, managed cavity trees. The decision whether to remove the buffer markings will be made by an RCW biologist. Living cavity trees where buffers have been removed will be painted as previously described with two green bands.

The RCW biologist will determine if the buffer should be marked when new cavity trees are created by RCWs around existing buildings or facilities. Buffers will not be marked in the EIA because these areas are not utilized for land-based maneuver training.

Training

The protection of clusters and recruitment clusters on Fort Jackson depends on an understanding of the goals and requirements of RCW conservation by the military personnel training on the installation. Soldiers are informed of endangered species information and training restrictions as part of the Environmental Compliance Officer course.

Fort Jackson Regulation 350-14 (Range Regulation) controls damage and disturbance in clusters outside the EIA. Entry into and training in an RCW cluster is strictly regulated. Standard training guidelines state that military training within 200 feet of marked cavity trees is limited to activities of a transient nature (less than two hours occupation). Appendix 1 of the Guidelines provides a list of prohibited and permitted training activities in marked buffer zones around cavity trees.

Training restrictions will apply only within marked buffer zones around cavity trees. The restrictions will apply to a recruitment cluster once it is provisioned and the cavity trees and buffer are marked. Cavity trees marked with two light green bands, as previously discussed, will not have buffer zones marked or training restrictions.

Military personnel are prohibited from cutting down or intentionally destroying pine trees without prior approval of the DPW Wildlife Branch. Pine removal installation-wide must be approved through environmental review procedures prior to their removal. These restrictions do not prohibit DPW natural resources personnel from using prescribed fire, silviculture treatments, or any other accepted management practice in the performance of their mission.

Even though damage to cavity trees is not expected, military units at Fort Jackson are required to report damage to any cavity tree or extensive soil disturbance within and around marked cavity tree buffers to Range Operations. Range Operations, as soon as possible after notification is received from the unit, will report this damage to the DPW Wildlife Branch, which will assess the damage.

An artificial cavity will be constructed within 48 hours if a cavity tree is destroyed in an active cluster or provisioned recruitment cluster. Cavity trees destroyed in the EIA, which will likely be discovered only by natural resources personnel entering clusters in this area, will be replaced when access to construct replacements is permitted. Significant soil disturbance within or adjacent to marked buffers outside the LMA will be repaired as soon as practicable to prevent degradation of RCW habitat. All digging for military training activities in the HMU will be filled by Soldiers and inspected by Range Operations upon completion of training.

If the measures previously described fail to control damage and disturbance, trails and firebreaks located within the cluster may be closed by erecting gates, and, if necessary, allowing these areas to re-vegetate. Fort Jackson will consult with the Service prior to the establishment of new trails, roads, or firebreaks, which permit vehicle, travel through an RCW cluster.

Translocation

Translocation is the artificial movement of wild organisms between (interpopulation) or within (intrapopulation) populations to achieve management objectives. As described in the Recovery Plan, translocation can be used for several applications. On Fort Jackson, translocation will be used for augmentation, strategic recruitment, and for management of genetic resources.

Augmentation is a means of buffering small populations against the effects of demographic and environmental stochasticity. On Fort Jackson, this will be accomplished by moving a potential mate to a cluster inhabited by a solitary individual (mate provisioning) or by moving pairs to recruitment clusters to increase the population size (augmentation). Strategic recruitment is achieved by moving birds from within or between populations to recruitment clusters strategically located to link groups and subpopulations. This type of recruitment cluster creation and translocation will be targeted at developing beneficial spatial arrangements to increase the persistence and health of RCW clusters and the overall population. Strategic recruitment will be accomplished by both mate provisioning and augmentation. Genetic resources will be added by the introduction of individuals from other populations, improving the overall genetic diversity of Fort Jackson's RCW population.

Fort Jackson exceeded the critically small population threshold of 30 PBGs in 2011 (31 PBGs) and may be taken off the list of eligible recipient populations. However, continued eligibility for translocation of pairs from other populations would benefit population stability and growth. Translocation of pairs will be used strategically to introduce RCWs to unoccupied habitat that is somewhat distant from the core of the population, and is often separated by currently unsuitable habitat. Efforts will be made to move eligible birds on Fort Jackson from existing clusters to unoccupied habitat. However, RCWs eligible for translocation on Fort Jackson are few because of our small population size. For this reason, Fort Jackson is requesting consideration to receive RCWs from other populations over the next several years with the goal of growing our population into previously unoccupied segments of the HMU.

Translocation procedures as described in Section 8.H. and Appendix 3 of the Recovery Plan will be followed. Modification to the processes outlined in these guidelines may be necessary if birds are translocated into the EIA due to access limitations. Translocations will not be undertaken without the approval of and close coordination with the Service. Fort Jackson has obtained an ESA section 10 permit (endangered species) for RCW management, including translocations. Persons marking, banding, and handling birds shall have the appropriate permits prior to performing these activities, or be in the presence of permitted individuals. Permits will be kept current.

Monitoring Plan

Habitat Monitoring

Comprehensive surveys for new cavity trees and clusters were already conducted on Fort Jackson. Detection of previously unknown cavity trees or clusters typically occurs coincident to annual inspections of known clusters and adjacent habitat areas, or during other management activities by natural resources personnel. Natural resources personnel will report any new

activity observed during their routine work. Surveys in previously unoccupied habitat will be conducted if the RCW biologist determines that changes in habitat conditions or population distribution increases the likelihood of RCW occurrence. Survey data will be used to generate installation RCW maps accurately depicting the location of RCW clusters. The maps will be widely distributed for use by those conducting land use activities on the installation. Maps will be updated annually.

Fort Jackson will assess the quality and quantity of installation-wide foraging habitat using the Service Matrix tool at a minimum of once every 10 years and midstory at a minimum frequency of once every 5 years in the HMU. Foraging habitat will be assessed for all elements identified in the Recovery Plan under Paragraph 8.I. While much of Fort Jackson's HMU does not currently meet these standards, the desired future condition for RCW foraging partitions is the recovery standard. These analyses were last completed in 2012.

Forest stand inventories are needed periodically to properly manage the forest, including RCW nesting and foraging habitat. Forest stand inventories will be conducted according to accepted sampling techniques. Inventories on the ground will only be accomplished where deemed safe. The last forest inventory on Fort Jackson was completed in 2011.

Fort Jackson will keep accurate records of the timing and extent of all prescribed and wild fires in the HMU. These records will be maintained in a GIS database.

Cluster Status and Condition Inspections

Active clusters, selected inactive, and provisioned recruitment clusters will be inspected annually (or more frequently). These are prescriptive inspections, used to develop treatments and modifications of treatments to maintain suitable nesting habitat. Inspections in the LMA will be performed upon approval of Range Operations and the Safety Office. At a minimum, Fort Jackson will inspect and record data for:

(1) Density and height of hardwood encroachment;
(2) Height of new RCW cavities (the initial inspection measured height of all existing cavities);
(3) Condition of cavity trees and cavities;
(4) A description of damage from training, fires (prescribed or wild), etc.;
(5) Evidence of RCW activity for each cavity tree (includes each cavity in the tree) within the cluster.

Inspections of inactive clusters will include observations of the condition of live cavity trees and a ground examination of cavities for activity. Closer inspection of cavities, which appear from the ground to be active, may be conducted. Inactive clusters containing cavities, which appear from ground or close inspection to be active will be group checked for the presence of RCWs and those trees found to be active will be managed according to the ESMC. The Service will be consulted regarding management of those found active outside of the HMU.

Project Surveys

Surveys are used to determine whether the nesting and/or foraging habitat of a RCW group will be adversely impacted by a proposed project, such as a timber sale or range construction. The guidance provided in Section 8.I. and Appendix 4 of the Recovery Plan will be followed for project surveys. Prior to any timber harvesting operations, construction, or other significant land-disturbing activities in suitable habitat on Fort Jackson, a survey of the affected area for unknown cavity trees will be conducted. The "affected area" for RCWs includes the project site plus the area within 1/2 mile of the project boundary. The surrounding 1/2 mile is included because projects have the potential to remove foraging habitat for an unknown active cluster, which may be located within 1/2 mile. Locating such a previously unknown cluster would require ensuring adequate foraging habitat remains for it and any other cluster(s) within 1/2 mile of the project site.

The boundary of the project site is determined by evaluating the impacts of the project to the area. For example, the project site to be surveyed for the construction of a range will consist of the area to be cleared for the range plus the surface danger zone (area potentially affected by the firing of the weapons) for the weapons. The area to be adversely impacted is determined through consideration of such factors as the weapon systems involved, the presence or absence of effective berms, and the topography of the site and its surroundings. In this case, the project site consists of the area where tree mortality is most likely to occur due to the firing of weapons on the range.

For all categories of projects other than projects not requiring surveys and projects requiring surveys of only the project site, a survey of the project site and affected area will always be conducted. Forestry project sites generally cover larger acreages than construction projects; however, forestry projects are designed to provide better habitat for the RCW. For forest thinning projects, natural resources personnel will survey pines for undocumented cavities in the project site during timber marking activities, and this will suffice as a survey of the project site. For logging operations where timber is not marked by Fort Jackson natural resources personnel (i.e. operator select harvesting), the site will be surveyed for undocumented cavity trees prior to the timber sale. Project site surveys for single-tree or group selection regeneration projects will be treated similar to a thinning as discussed above.

Surveys will not be conducted off-post. The relatively small amount of nesting habitat, which exists around Fort Jackson generally, has extensive hardwood midstory problems. In addition, the South Carolina Department of Natural Resources (SCDNR) has not located any RCW clusters near the installation. SCDNR has a statewide database of known RCW clusters that is available upon request.

Not all of the varied projects conducted at Fort Jackson require surveys of the entire affected area. Projects at Fort Jackson are being placed in categories as discussed in the following subsections. For safety reasons, no surveys will be performed in the EIA.

Projects Not Requiring Surveys

Surveys will not be conducted for certain categories of projects (unless they are deemed necessary by a RCW biologist) as follows:

(1) Projects in habitat unsuitable for the RCW. Unsuitable habitat includes areas that are not nesting habitat and do not fulfill the definition of foraging stands.
(2) Prescribed burning.
(3) Projects not requiring pine tree removal.
(4) Project sites in the cantonment areas.
(5) Projects that require only removal of pine trees under four inches DBH. Removal of pines less than four inches DBH normally will have no adverse impact because RCWs usually forage on larger pines and cavities are not typically constructed in pines this small.

Projects Requiring Surveys of Only the Project Site

This category of projects only involves inspecting the potential cavity trees to be removed. Projects include:

(1) Projects on the installation requiring removal of 10 or fewer pine trees greater than four inches DBH. Long, linear projects (e.g., powerline maintenance) removing 10 or fewer pines of this size within any 1/2 mile stretch are included. Unless an RCW cavity is present, removal of such a small number of pines, which may be potential foraging habitat, is highly unlikely to adversely impact this endangered species.

(2) Timber salvage operations. Salvage will be limited to trees expected to succumb, unless the cause of tree damage is expected to spread (e.g., diseases or pest infestations). If damage spread is expected, additional trees may be removed to curtail damage to surrounding areas. A wildlife biologist may determine that dying pines should be left standing if the disease or infestation is unlikely to spread, and the resultant snags will not create safety hazards.

Projects Requiring Survey of the Project Site and Surrounding 1/2 Mile

Surveys for all projects will be conducted following the guidelines set forth in Appendix 4 of the Recovery Plan. Discussions in this section address military training exercises and activities, construction projects, and forestry projects.

The first step in the survey procedure is to determine if suitable nesting or foraging habitat exists in the area to be impacted by the project. If no suitable habitat is identified, further assessment is unnecessary and a "no effect" determination is appropriate. If no suitable nesting habitat is identified, but suitable foraging habitat is present and will be impacted, potential use of this foraging habitat by groups outside the project boundaries must be determined. This is determined by identifying any potential nesting habitat within half mile of the suitable foraging habitat that would be impacted by the project. Survey protocols discussed in Appendix 4 of the Recovery Plan will be followed to identify any active clusters. If no active clusters are found, then a "no effect" determination is appropriate. If one or more active clusters are found, a foraging habitat analysis will be conducted to determine whether sufficient amounts of foraging

habitat will remain for each group post project. This analysis will be completed using the RCW Matrix Tool and forest inventory information contained in Fort Jackson's GIS forest inventory database.

Projects that are likely to adversely affect RCW habitat and recovery will be subject to formal consultation with the Service. The guiding principle of these surveys, as noted in the Recovery Plan, is that, if the installation can demonstrate reasonable progress toward meeting the recovery standard and support of IPGs, most projects can be implemented. For a more detailed discussion of reasonable progress, see Section 8.I. of the Recovery Plan.

Population Monitoring

Fort Jackson will conduct scientifically sound monitoring programs to determine demographic trends within the RCW population as a whole. Population monitoring will follow the Guidelines, which states that all active clusters will be monitored annually in populations with less than 100 active clusters. Monitoring in the LMA will occur upon approval of Range Operations and the Safety Office.

Fort Jackson currently has 37 active clusters, which will all be monitored for demographic trends. When the number of PBGs exceeds 100, 50% of the RCW clusters will be intensively monitored for demographic trends. All clusters will continue to be monitored for activity status, regardless of population size. Monitoring activities will be performed annually to determine the number of adults and fledglings per site, sex of birds, number of breeding groups, and number of nests. Birds will be color banded to enable the monitoring of group size and reproductive success. Banding will follow the procedures set forth in Appendix 2 of the Recovery Plan. Monitoring results will be recorded and retained permanently so trend analysis is possible.

Provisioned recruitment clusters will be group checked biannually to determine their status (i.e., active or inactive) and if additional monitoring is required. These checks will determine which sites have been activated either by successful translocation or by natural dispersal. The newly active recruitment clusters will be monitored as described in the previous paragraph.

Sharing Data with the Service

Fort Jackson will report RCW population data, all actions taken to recruit RCWs, and habitat improvement measures to the Service annually by January 31 using the Digital Annual Reporting Tool or other methods required by the Service. Copies of this annual report will also be provided to the local Service field office in Charleston, SC and to the SCDNR. A report summarizing population trends and management activities will also be given at an annual Army/Service RCW meeting, typically in February or March of each year.

If data suggest that Fort Jackson's population is declining, the Service will be consulted to determine if a plan is needed to prevent further decline. If needed, a plan will be developed in consultation with the Service. Critical population decline is defined in two different ways. A population is considered declining if either of the following criteria is met:

(1) The number of active clusters decreases by 10% from one year to the next.
(2) The number of active clusters decreases by 10% within five years.

Captured clusters will not be included in this calculation.

Ten Year Forest Inventory

Fort Jackson's original forest inventory was completed in 1992. After this initial inventory was completed, it was decided to inventory 10% per year, rather than re-inventory every 10 years. However, due to resource limitations this was never accomplished. An installation wide inventory was initiated in 2009 and was completed in 2011. The final product includes new data for all current and potential RCW habitat in the SDMA. Surrogate data from comparable stands outside the LMA will be used to update inventory data for potential habitat stands in the LMA. The update to the LMA stand data will be completed in 2013. This forest inventory data will be used in five years to revise the HMU as part of the 5-year ESMC revision.

In conducting the forest inventory, data will be gathered to accurately determine the quantity and quality of available foraging and nesting habitat for the RCW. Forest inventories will be conducted using the point sample cruise. Forest inventories in the LMA may be conducted using scientifically accepted, aerial photography interpretation methods.

HABITAT MANAGEMENT UNIT

Fort Jackson has designated a HMU, which contains enough existing or potential nesting and foraging habitat to attain and sustain the installation RCW population goal. Fragmentation of nesting habitat was avoided in designating this HMU and corridors will connect all nesting areas allowing for demographic interchange throughout the installation population. Delineation of this HMU is an important step in the planning process because it influences the future geographic configuration of the installation RCW population. Updating the HMU will be an ongoing process, and the areas designated as HMU will be managed according to this RCW ESMC.

Management activities and practices in the HMU will be consistent with the conservation of other federally listed species and those proposed for listing. Conservation of candidate species will be considered to the extent possible. Fort Jackson will consult with the Service should conflicts between management of the RCW and another federally listed species arise.

As described above, the HMU consists of the LMA and SDMA. Total land area to be managed, population goal, and characteristics unique to the LMA are presented in the following section. Only the total land area to be managed and population goal are presented for the SDMA, because the standard management practices have been described in previous sections.

Limited Management Area (LMA)

Current and previous impact/danger areas that contain or likely contain UXO can pose danger to personnel. Natural resources conservation benefits to be gained by intensive management in high risk areas are not justified.

Several areas on Fort Jackson contain dangerous UXO. These have been identified as the LMA. The EIA contains unexploded artillery and mortar rounds, and other types of UXO. A section of this impact area, the Artillery and Mortar Target Zone (AMTZ), is heavily dudded and continues to receive fired ammunitions, which may produce additional UXO. Ammunitions, which miss the AMTZ or are deflected from it, will continue to create hazards in the area surrounding the AMTZ. The ability to conserve RCW habitat in this impact area is questionable because use of weapons, including high-explosives and those that produce shrapnel, are being fired into this area. Weapons used at Fort Jackson and weapons being developed may reduce habitat conservation possibilities even further. The presence of UXO limits the ability of natural resource personnel to perform specific activities which would help maintain pine or pine-hardwood forest (i.e. planting and thinning pines), or improve habitat conditions for the RCW (e.g. midstory control).

Typically, Fort Jackson personnel prescribe burn the EIA annually, or portions thereof, utilizing aerial ignition. Biologists have managed clusters to some extent, in this impact area while being escorted by explosives experts from an Army Explosive Ordnance Detachment (EOD), or once EOD had surface cleared the clusters, their surroundings, and any access routes. Examples of management techniques used in the past include: inventories, monitoring, raking of cavity trees where permitted, and construction of artificial cavities. All RCW management activities will be performed in the LMA, including the EIA, as described previously in this ESMC except those modified or excluded below.

No soil disturbing activities, including those requiring use of vehicles, will be performed in the LMA. This includes such activities as harvesting and planting trees and controlling hardwood midstory via mechanical or chemical means. Midstory can be controlled through injection of herbicides, though this method of controlling midstory will only be used in clusters where this is considered safe and practical. Aerial applications of herbicides for the control of hardwood midstory may be attempted if considered safe and environmentally sound. Management that does not cause soil disturbance (e.g., inventories, placement of restrictors, and construction of artificial cavities) is possible if considered safe by EOD, Range Operations, and the Safety Office.

Tracer bullets and other munitions fired into the EIA normally cause annual fires, which may occur during any season. Prescribed burns to reduce fuels available to wildfires are typically conducted annually to minimize the possibility of a severe or uncontrollable wildfire. Other areas of the LMA are prioritized for burning at least every three years, but may not be burned because of management and safety considerations. These areas must be burned using aerial ignition because of safety concerns. Protecting cavity trees during prescribed burns will be accomplished by raking fuel away from the cavity trees when permissible. Artificial cavities will be used to replace cavities damaged by fire.

Surveys for new cavity trees will not be conducted in the LMA. Surveying is considered particularly dangerous, even with an escort, because surveyors are observing the stems of trees instead of looking for UXO on the ground. Aerial surveys for new cavity trees will only be conducted if cost effective.

Conversion of stands to create additional habitat in the LMA is not possible because this would require soil disturbing activities (e.g., planting trees). This limits our management for the RCW to existing pine and pine-hardwood stands. In the EIA, annual wildfires, and prescribed burning, which are not conducive to the regeneration of pines, and the inability to perform various forest management techniques will limit the maintenance of pine and pine-hardwood stands. The extent to which munitions are affecting these stands is unknown, but may be contributing to a long-term reduction in these stand types in the EIA. This may restrict our ability to maintain active clusters for the long-term in the EIA.

Some of the best RCW habitat currently available on Fort Jackson is in the EIA. Presently, there are eight active clusters in the EIA. Eight clusters will be maintained as long as habitat is available. RCWs can be translocated into the EIA for augmentation or mate provisioning. These eight clusters will count toward the IPG as long as they can be monitored in accordance with Recovery Plan criteria to determine group size. However, access for monitoring and management is currently very limited and may become more so due to increased utilization of the ranges that fire into the EIA. If access becomes so limited that groups cannot be monitored in accordance with Recovery Plan guidelines, consultation with the Service will be initiated.

LMA areas outside of the EIA are not currently impacted by active ranges and do not burn annually. However, management is limited due to UXO and safety considerations. Management of other areas containing UXO will be similar to that previously described for the EIA, with the exception of the burning regime. Burning will be conducted by aerial ignition or by ring fire technique, if considered safe, in these areas.

According to the ESMC, none of the other UXO contaminated areas in the LMA contain enough existing pine or pine-hardwood forest to completely support a RCW cluster and foraging habitat. Most of the areas are widely separated and cannot be managed in conjunction with one another to support a cluster. However, one recruitment cluster was provisioned in the LMA outside of the EIA (Cluster 12B-A). This cluster had been inactive for over 10 years, but was reactivated in 2008. In consultation with the Service, the cluster was provisioned with cavities in 2009 (FWS Log No.: 2009-TA-0356). It has been occupied by a breeding pair since 2010, successfully breeding each year since then. Foraging habitat for this cluster is provided on Fort Jackson LMA and by property owned by the Department of Veterans Affairs on the Fort Jackson National Cemetery. Other than this recruitment cluster, the manageable acreage within these UXO areas outside the EIA will not affect (i.e., increase) the population goal for Fort Jackson. These areas will continue to be managed as described previously because each one with manageable habitat can provide at least a portion of one of the two main habitat components (i.e., nesting or foraging habitat). For example, the best available nesting habitat in an area may be in one of these sites containing UXO. In conjunction with some available forage habitat outside, but contiguous to, the UXO area, a cluster could be supported in the UXO area. The long-term viability of pine and pine-hardwood stands in these areas is also questionable.

Standard Density Management Area (SDMA)

The SDMA covers approximately 22,212 acres. The Service has indicated that a population density of one group per 200 acres is manageable in the sandhills physiographic province, which

includes Fort Jackson. The SDMA should support this density, thus, 111 active clusters is the population goal for the SDMA.

Special Considerations

Inactive Cluster Deletions

Deletion of inactive clusters, not appropriate for recruitment in the next ten years, will prevent problems in managing the RCW population on Fort Jackson. For example, where current foraging habitat and that which can be developed in the next 5 years will not support both an inactive cluster(s) and a more suitable recruitment cluster, deletion of the inactive cluster(s) is the best option. The inactive cluster(s) can become a recruitment cluster when the appropriate habitat is developed, if it is the best choice at that time. Clusters that have been monitored inactive for more than 5 years and are not planned for recruitment in the next 5 years will be deleted from management. Cluster deletion in these areas will permit resources to be directed where maximum benefits to the RCW will be realized.

Cavity trees in deleted clusters will remain in place and be protected as described previously described in this biological opinion (Protection of Clusters). However, the 200-foot buffer signs will be removed and the associated military training restrictions will no longer apply. Cavity entrances will not be covered unless reactivation of the inactive cluster would be harmful to RCWs or the cluster is not in the HMU and reactivation would conflict with critical missions (e.g., an inactive site near the firing line of WIA Range 19). Inactive clusters to be deleted on Fort Jackson will be determined by a RCW biologist in accordance with the Recovery Plan. Cluster deletion will occur only with the approval of the Service.

Incidental Take

According to the ESMC, incidental take of an RCW, both directly and through removal of habitat, may occur during management activities designed to conserve this species. During consultation with the Service, Fort Jackson will request incidental take of RCWs for the following management activities:

(1) Wildland Fire (Prescribed burning and Wildfires) - SDMA

Military training activities often result in the ignition of wildfires. Over the past five years, there has been an average of 23 wildfires on Fort Jackson each year. Although Fort Jackson has resources to suppress most wildfires, there is a possibility that RCW nests, cavity trees, and foraging habitat could be damaged or destroyed.

Individual RCWs, nests containing eggs and/or nestlings, cavity trees, and foraging habitat can be injured or destroyed as the result of prescribed burning. Measures taken to prevent damage or destruction to RCWs and/or cavity trees include raking or burning around cavity trees and the use of water and fire retardant materials. Foraging habitat is protected during prescribed burns by preparing and implementing a burn plan. The burn plan describes parameters such as weather and fuel conditions and equipment and personnel required to accomplish prescribed burn objectives while not adversely affecting RCW habitat. Even with these precautions, local

weather changes, higher than estimated fuel loads, and other unforeseen factors may cause escaped prescribed burns or out of prescription burns. Measures will be taken to extinguish prescribed burns that are out of prescription. Fire plows will be used in clusters only during emergencies. Fire plows cannot be used in the LMA due to UXO hazards. As a worst case scenario, Fort Jackson anticipates two incidental takes, over the 5-year life of the RCW ESMC, because of prescribed burning. This take may be in the form of harass, harm, wound or kill, loss of nest, active cavity, or adult.

(2) Activities inside LMA

The presence of UXO in the LMA may prevent the use of reasonable and prudent fire protection measures such as raking or burning around cavity trees. Standard fire suppression activities cannot be performed within the LMA. Wildfires are controlled at the perimeter of the LMA only. Therefore, incidental take may occur because of wildfire. Additionally, incidental take in the EIA may occur due to munitions being fired into this area. Incidental take for all clusters in the LMA, including recruitment clusters, is requested (nine clusters). Incidental take for all clusters in the EIA was previously given (eight clusters) (FWS Log No. 4-6-00-F-199).

Installation staff will immediately notify their major command and the Service in the event of an incidental take.

Metal Contaminated Areas

Clusters and surrounding foraging area in the EIA will be designated as "no fire areas" to the degree practicable to protect clusters from projectile damage. There are no current plans to increase the number or effectiveness of berms on existing ranges. Berms are recommended for the construction of new ranges to limit down-range habitat damage. All proposed new range construction will be evaluated for impacts to endangered species, and consultation with FWS performed.

Forest stands adjacent to the EIA that have been heavily damaged by small arms projectiles and continue to receive metal contamination have been deleted from the HMU. These areas are not considered manageable RCW areas for the long-term.

Conservation on Adjacent Lands

Necessary habitat for the RCW includes nesting and foraging areas. Both of these habitat components for a given cluster may be located entirely on installation lands, or there may be instances where one of these components is located on installation land and the other is located on adjacent or near-by non-Army land. The Service and Fort Jackson will initiate cooperative management efforts with these landowners, if such efforts would complement installation RCW conservation initiatives.

Ecosystem Management

Conservation of the RCW and other species is part of a broader goal to conserve biological diversity on Army lands consistent with the Army's mission. Biological diversity and the long-

term survival of individual species, such as the RCW, ultimately depend upon the health of the longleaf pine ecosystem; therefore, the success of Fort Jackson's RCW ESMC depends on longleaf pine ecosystem integrity. Management of this ecosystem will benefit a variety of species, including the RCW. Maintenance of ecosystem integrity and health also benefit Fort Jackson, the Army, and our Nation by preserving and restoring training lands for long-term use.

Regional Conservation

The interests of Fort Jackson and the RCW are best served by encouraging conservation measures off the installation. Fort Jackson has participated in efforts to conserve RCWs and longleaf pine on private lands in the vicinity of the installation. Fort Jackson will continue to participate in promoting cooperative RCW conservation plans, solutions, and efforts with other Federal, State, and private landowners in the surrounding area.

Maintaining the HMU

One of the major challenges Fort Jackson will face over the long-term is maintaining the size of the HMU. The main reason is the HMU was designed with knowledge of only short-term mission requirements. The current mission of the military is in a state of change, which will likely affect even short-term mission requirements of the installation. It may be difficult to restrict all new facilities and ranges to areas outside the HMU if additional or new missions are brought to Fort Jackson.

Should a significant change in the military's missions at Fort Jackson occur, we would have to expand facilities to train additional soldiers. In the event that installation expansion is required, Fort Jackson will consult with the Service regarding potential adverse impacts to the RCW.

Unplanned projects are likely to occur in the HMU. Consultation with the Service regarding a change to the HMU and IPG will not be initiated unless the cumulative removal in five years exceeds 200 acres of the SDMA. Projects requiring removal of less than 1/4 acre of the HMU will not be tallied. Consultations will be conducted on situations potentially affecting active clusters, recruitment clusters, or their foraging habitat outside the scope of this ESMC. Fort Jackson will initiate consultation before major construction projects in the HMU, such as new ranges, are initiated. The ESMC, including the HMU and resultant population goal, will be reviewed annually and revised as necessary every five years.

Cooperation with the Service

Fort Jackson will work closely and cooperatively with the Service on RCW conservation and ecosystem management. The installation will routinely engage in consultation with the Service to ensure that proposed actions are consistent with ESA requirements. Consultation, if necessary, will be initiated prior to any significant changes to this plan.

Effects on Training

Implementation of this ESMC will have both positive and negative effects on training at Fort Jackson. Deletion of inactive clusters near critical training areas should reduce the possibility of

conflicts at these sites by removing the training restrictions associated with 200-foot buffers of managed clusters. Any incidental take issued will reduce the liability of personnel for accidents, which may occur. This ESMC document will help Fort Jackson planners in selecting locations for new construction and other projects.

A great deal of planning requiring close coordination between natural resources personnel and military personnel will be necessary to ensure any effects are minimized. This will be accomplished through the INRMP and its annual work plan. At times, the specific location of clusters interferes with field exercises designed to simulate battle conditions. However, this is not a major impediment to training. This may actually increase the effectiveness of the training by requiring commanders to be creative in overcoming this "obstacle," just as they would have to overcome obstacles encountered in battle.

The ESMC's effect on training in the long-term is more difficult to predict because of unforeseen changes. There will be more clusters where limitations on training may occur. If these sites average about 10 acres in size, about 700 additional acres will have restricted training. Thus, the potential for clusters to affect certain types of field training exercises may increase.

Time required to review projects planned in or near the HMU may increase as the number of active clusters increases. This is due, for example, to the more frequent cavity tree surveys that will be required. The open, park-like pine stands to be created and maintained, in combination with leaving bottomland and some upland hardwoods, should provide suitable conditions for basic training. Another benefit to Fort Jackson may be that certain training restrictions may be relaxed or removed as the population increases.

Resources Required

According to the ESMC, the planning and funding period for the implementation of this ESMC is five years, though some components extend beyond this time frame. The estimated required staff is currently available within the Environmental Division (ENV) Table of Allowance & Distribution (TDA). In addition to the required staff, assistance from other agencies and contractors will be required to implement all the tasks outlined in this ESMC. Assistance is required in performing annual surveys for cavity trees, reforestation activities, habitat improvements, prescribed burning, and translocating RCWs to Fort Jackson.

Sufficient equipment needed to support implementation of this ESMC is accounted for within the ENV. Additional equipment needs identified will also be obtained and accounted for by the ENV.

STATUS OF THE SPECIES

Species Description

The RCW is a medium-sized bird, approximately 8 to 9 inches tall and weighs roughly 1.5 to 1.75 ounces. RCWs have a black cap and nape, a large white cheek patch, and black and white horizontal bars on their back and wings (Service 2003). These cheek patches distinguish RCWs

from all other woodpeckers in their range. The sexes of the adult woodpeckers are similar in color and are difficult to distinguish in the field.

The U.S. Department of the Interior (USDI) identified the RCW as a rare and endangered species in 1968 (USDI, 1968). In 1970, the RCW was officially listed as endangered (Federal Register 35:16047). With passage of the ESA in 1973, the RCW received the protection afforded listed (endangered) species under the ESA. No critical habitat has been designated for the RCW.

The current distribution of this non-migratory, territorial, species (endemic to open, mature and old growth pine ecosystems) is restricted to the remaining fragmented parcels of suitable pine forest in 11 southeastern states; it has been extirpated in New Jersey, Maryland, Missouri, Tennessee and Kentucky (Service 2003b). As of April 2003, there were an estimated 14,500 RCWs living in 5800 active clusters across 11 states (Service, unpublished data, 2003). This is less than three percent of estimated abundance at the time of European settlement.

Despite the protection of the ESA, all monitored populations (with one exception, see Hooper et al. 1991) declined in size throughout the 1970's and into the 1980's. Although populations have become more fragmented and isolated, the RCW is still rather widely distributed.

RCWs survive as very small (one to five groups) to large (groups of 200 or more) populations. Small populations in the interior are found in southeastern Oklahoma, southern Arkansas, and southeastern Virginia. The majority of the largest populations remaining are located in the longleaf pine forests of the Sandhills of North and South Carolina and the Coastal Plain longleaf pine forests of North and South Carolina, Georgia, Florida, and Louisiana; and loblolly/ shortleaf pine forests of eastern Texas.

Life History

The RCW is a territorial, non-migratory, cooperative breeding species (Lennartz et al. 1987; Walters et al. 1988). It is unique in that it is the only North American woodpecker that exclusively excavates its roost and nest cavities in living pines. Usually, the trees chosen for cavity excavation are infected with a heartwood decaying fungus (*Phellinus pini*) (Jackson 1977; Connor and Locke 1982). The heartwood associated with this fungus and typically required for cavity excavation, is not generally present in longleaf pine and loblolly pine until 90 to 100 and 75 to 90 years of age, respectively (Clark 1992a; Clark 1992b). Each group member has its own cavity, although there may be multiple cavities in a cavity tree. The aggregate of cavity trees, surrounded by a 200-foot forested buffer, is called a cluster (Walters, 1990). Cavities within a cluster may be complete or under construction (starts) and either active, inactive or abandoned.

RCWs live in social units called groups; this family unit usually consists of a breeding pair, the current years offspring and zero to four helpers (adults, normally male offspring of the breeding pair from previous years) (Walters 1990). Some populations have documented instances of female helpers (Walters 1990; Delotelle and Epting 1992; Bowman et al. 1998). A group may contain from one to seven birds, but never more than one breeding pair. Groups maintain year-round territories near their roost and nest trees. Subadult females from the current years breeding season normally disperse, prior to the next breeding season, or are driven from the group's territory by the group.

RCWs forage almost exclusively on pine trees. Although in some habitat types they will use smaller pine trees as foraging substrate (Delotelle et al. 1987) they prefer pines greater than 10-inch DBH (Service 1985; Hooper and Harlow 1986; Engstrom and Sanders 1997). Determining the number of pines required to provide the arthropod biomass needed to meet their year-round dietary requirements continues to be a challenging research problem. Many complex and interrelated factors undoubtedly contribute to the answer, including condition of the understory plant community, annual weather fluctuations, forest type, soils, physiographic province, season-of-year, and fire frequency and intensity.

Recent studies have examined how prescribed burning in longleaf pine-wiregrass ecosystems influences the structure and composition of groundcover, e.g., herbaceous vs. shrubby, and in turn how the groundcover may be related to RCW fitness, e.g., group size and fledglings produced (James et al. 1997, 2001). Research on how ecosystem processes, such as fire, affect the abundance and diversity of RCW prey in different pine habitats, still needs to be conducted. The number of acres required to supply adequate foraging habitat depends on the quantity and quality of tree stems available.

Population dynamics

Population Size

Reduction in population size may jeopardize the continued existence of any endangered species because the longer a species remains at low population levels, the greater the probability of extinction from chance events, inbreeding depression, or additional environmental disturbance (Gilpin and Soule, 1986; Goodman, 1987a; 1987b; Pimm, 1991; Shaffer, 1987; Underwood, 1989). Although population size has a clear relationship to a species extinction probability, it can be less important than population variability. Large populations may not protect a species from extinction in this face of environmental disturbance (Pimm, 1991; Underwood, 1989; Shaffer, 1987).

Long-term viability of a RCW population, in genetic terms, is not an issue with the RCW. There are no differences in the genetic variability of the eastern RCW's when compared with the western ones. Any prediction of a population's viability should not only be based upon these genetic factors, but also must consider the populations ability to survive population fluctuations due to demographic and environmental fluctuations (Koenig, 1988) or environmental catastrophes. Although population models to calculate the number of individuals needed to withstand such irregular events are not well developed, it is generally agreed that demographic and environmental fluctuations necessitate an increased number of breeding individuals to make sure the long-term persistence of a population in an area (Koenig, 1988). Because of the cooperative breeding nature of the red-cockaded woodpecker, their populations may require fewer breeding individuals to meet demographic fluctuations. However, the spatial distribution of clusters within a population is important to withstand both demographic and genetic stochastic (random) changes by facilitating dispersal and, therefore, gene flow (Letcher *et al.,* 1998).

Population Variability

Fluctuations in species population over time can affect significantly the probability of its extinction (Pimm, 1991). As a population fluctuates, one or more factors can lead to chance extinction, e.g., irreversibly lowering population size to a point where it can no longer recover. Consequently, actions increasing species' population variability may affect the continued existence of the species more significantly than a reduction in population size. Population variability is affected by several characteristics of a species' life history, including: widely variable mortality rates resulting from unstable food resources or predation; population density; sex ratios; recolonization rates; and genetic variability (Pimm, 1991; Underwood, 1989).

Reproductive rates, population density, and recolonization rates may influence red-cockaded woodpecker population variability more than mortality rates, sex ratios, and genetic variability. RCWs exhibit relatively low adult mortality rates; annual survivorship of breeding male and female RCWs from 72 to 84 % and 51 to 81 %, respectively (Lennartz and Heckel, 1987; Walters *et al.*, 1988; Delotelle and Epting, 1992).

On sex ratios, only two studies (Francis Marion National Forest [FMNF] and Central Florida populations) report significantly different fledgling sex ratios than 50:50 (Gowaty and Lennartz, 1985; Epting and Delotelle, unpublished data.); however, other populations report an unbiased sex ratio (Walters, 1990; unpublished data, LaBranche, 1992; Hardesty *et al.*, 1997). Examination of data on fledgling sex ratios from other populations across the region reveals similar variability (R. Delotelle, unpublished data.). Because most managers and researchers do not report significant differences from the expected 50:50 ratio, it is assumed that they are finding normal ratios. Reasons for the differences in sex ratios between the two populations initially discussed and most (presumably) other populations are uncertain, as are the implications for population variability.

RCW genetic research to date does not suggest that genetic variability is a serious concern at this time; however, genetic variability normally decreases in small, isolated populations. RCWs exhibit inbreeding depression and inbreeding avoidance behaviors (Daniels 1997; Daniels and Walters 2000). Inbreeding is expected to affect population viability in populations of less than 40 potential breeding groups, and may be a factor affecting viability in isolated populations of 40 to 100 potential breeding groups as well. Immigration rates of two or more migrants per year can effectively reduce inbreeding in populations of any size, including small ones. Stangel *et al.* (1992) reported no significant relationship between heterozygosity and population size (when two small populations, of the 26 sampled, were removed from the analysis). Additionally, although allelic diversity was correlated with population size and had eroded in some small populations, most populations were still characterized by normal levels of genetic variability. Haig and Rhymer (1994) examining the genetic variation among 14 RCW populations concluded that RCWs do not appear to have major genetic differences among regional populations.

Reproductive rates for RCWs are variable. Although RCW groups produce broods fairly reliably, these broods are relatively small. This is because clutch size is modest and, more importantly, because partial brood loss is greater than in other species of primary cavity nesters in the United States (LaBranche and Walters, 1994). Most clutches contain two to four eggs,

although the range is one to five eggs. There is variation among populations in clutch size, with population averages ranging from 2.9 to 3.5 eggs. The average number of young fledged from successful nests is about two in northern populations. Broods of one to four are common, and rarely five young are fledged from a single nest. Because some groups do not nest and others fail in their attempts, the average number of young produced per group is about 0.5 fledgling less, ranging from 1.4 to 1.7 among populations and from 1.0 to 1.9 among years within populations. Productivity in Florida populations typically is less (averaging 0.9 to 1.6) due largely to greater partial brood loss. Walters et al. (1988) suggest that annual variation in reproductive effort may be associated with food availability, weather and cavity competition.

Although the relationship between RCW population variability and population density is not well understood, some aspects of population density as it relates to group size and population trend have been examined. Connor and Rudolph (1991) found that in sparse populations, as fragmentation increased, RCW group size and the number of active clusters decreased. Hooper and Lennartz (1995) suggested that populations with less than 4.7 active clusters within 1.25 miles, on average, had critically low densities that inhibited population expansion. Beyer *et al.* (1996) also speculated that low RCW densities (4.8 active clusters within 1.25 miles) on the Wakulla Ranger District, Apalachicola National Forest (ANF) might have been implicated in that subpopulation's declining trend.

RCW populations can be increased because of their ability to recolonize unoccupied habitat made suitable by providing the limiting resource of cavity trees, via artificial cavities (Copeyon, 1990; Allen, 1991). Eight recent examples of population expansions have been documented (Gaines *et al.*, 1995; Franzreb, 1999; Carlile *et al.*, 2003; Doresky *et al.*, 2003; Hagan *et al.*, 2003a; Hedman *et al.*, 2003; Marston and Morrow, 2003; Stober and Jack, 2003); artificial cavity provisioning was the common denominator. Walters *et al.* (1992a) conclusively demonstrated that unoccupied sites remain so because they lack suitable cavities. Walters et al. (1992b) cooperative breeding ecological model for RCWs strongly suggests that individual RCWs are better off from a fitness perspective (first year survival, rate of successful dispersal, reproductive success at early ages) competing for a high quality territory (i.e., one with cavity trees) than accepting a territory without this critical resource.

Prior to routine use of artificial cavities for stabilizing and expanding populations, most populations were declining and many had been extirpated (Baker, 1983; Costa and Escano, 1989). While acknowledging that most RCW populations have not increased on their own (in the absence of artificial cavities), it is equally important to point out that the two largest populations in the 1980's, the FMNF and the ANF increased by about ten percent between 1980/81 and 1987/88 (FMNF) and 1990/91 (ANF) (Hooper *et al.*, 1991; R. Costa, Service, unpublished data). The common denominators in these landscapes were large population size (480-500 active clusters), dense populations, availability of well-distributed relic longleaf pines, and open park-like forests the result of frequent prescribed fire since the 1940's/50's.

Population Stability

Population stability, the ability of a species' populations to resist change or dramatic fluctuations over time, directly affects a species' sensitivity to the adverse effects of a proposed action. While

many RCW populations have been extirpated, many others, some very small and seemingly demographically isolated, have persisted for ten, plus years, although their long term survival is certainly not secure. This survival for ten plus years (stability is not an accurate description, as most of these populations have been slowly declining) of small populations is probably related to: long life span (ten year old birds are not uncommon); predation/exposure protection afforded by a permanent, secure roost chamber; relatively consistent number of fledglings per successful nest; dispersal ability (DeLotelle *et al.*, 2003); and cooperative behavior at territory defense and raising young.

The majority of larger populations (50+ active clusters) is not increasing and can only be classified as stable; several are decreasing. The instability of declining populations is frequently related to poor habitat conditions, and the demographic isolation of individual groups and/or the intra-population distribution of groups brought about over time by the gradual loss and degradation of suitable habitat. Management designed to improve habitat conditions at the critical resource, the cluster/cavity tree core area, has contributed to the stability of both large and small populations. Primary management has been the installation of artificial cavities and hardwood midstory control. Additionally, the benefits afforded large, dense populations regarding potential breeding opportunities, account in part, for their stability.

Status and Distribution

The decline of the RCW from the time of European settlement through the 1980s has been well documented and is directly related to loss and degradation of its old growth pine habitat. However, this range-wide decline has been halted and reversed, and in many populations, particularly Army installations, trends are now increasing or at least stable. In the 1990's and through today, in response to intensive management based on a new understanding of population dynamics and new management tools, e.g., artificial cavities (Copeyon 1990, Allen 1991) and translocation (Costa and DeLotelle 2006), most public land populations, and those private land populations in partnerships with the Service, were stabilized and many showed increases. However, some populations remain in decline and most have small population size; i.e. <50 active clusters.

In 1993/1994, the range-wide population was estimated at 4,694 active clusters; in 2006 it was 6,105. However, not all populations required for downlisting and delisting are increasing. For example, of the 57 Federal populations (Federal populations comprise the majority of populations involved in recovery criteria), and based on a five-year trend period from 2000 to 2005, 12 (21%) were decreasing, 10 (18%) were stable, 31 (54%) were increasing, and four (7%) were extirpated. These populations include 13 on national 25 wildlife refuges, 15 on military installations, 26 on national forests, and one each on lands administered by the Department of Energy, Bureau of Land Management, and National Park Service.

Range-wide RCW population status and trend		
Year	# Active Clusters	Source
1993	4,694	Costa and Walker (1995)
2003	5,625	U.S. Fish and Wildlife Service (2003b)
2004	5,800	Costa and DeLotelle (2006)
2005	5,903	U.S. Fish and Wildlife Service (unpubl. data 2005)
2006	6,105	U.S. Fish and Wildlife Service (unpubl. data 2006)

A 2005 analysis of the 128 properties (all public [53 Federal, 36 State] and 39 private properties harboring RCWs) submitting reports via the Service Annual Population Data Report illustrates the status of the species at the property scale. When examined from the property perspective it is clear, that although several large populations exist, the vast majority (73%) of properties harbor fewer than 40 active clusters. Indeed, 90% of properties harbor fewer than 100 active clusters.

Although some recovery populations are composed of one of more properties (e.g., because the properties are adjacent to one another), most recovery populations (64%) are located on one property/ownership. The RCW Recovery Plan identifies 63 properties involved in recovery: 26 primary core (PC), 14 secondary core (SC) and 23 essential support (ES). As of January 2005, four properties (3 PC, 1 SC) were declining, 29 (12 PC, 3 SC, 14 ES) were stable and 30 (11 PC, 10 SC, 9 ES) were increasing (Service, unpublished data, 2005). Of the 63 recovery properties, only six (9%) exceed 250 active clusters; 15 (24%) harbor fewer than 10 active clusters, while 14 (22%), 23 (37%) and five (8%) harbor 10-30, 31-100 and 101-250 active clusters, respectively (Service 2005 unpubl. data, 2007). Fifteen (22%) of the 63 recovery properties have achieved their recovery population goals. Five (13%) of the 39 recovery populations required for delisting have achieved their recovery population goals.

In spite of the relatively small size of most populations, the status of RCWs has been consistently improving since the early 1990s (see table above). This steady increase can be attributed to various factors, including aggressive prescribed burning programs, artificial cavity provisioning and regional translocation cooperatives and strategies (Costa and DeLotelle, 2006). Implementation of these habitat and population management tools and techniques has successfully reversed the regional declines of the previous decades. Indeed, these activities have been primarily responsible for the population increases on Army installations during the past decade.

Analysis of the species/critical habitat to be affected

The proposed action has the potential to adversely affect RCWs within the Fort Jackson Army Training Base. The effects of the proposed action on RCWs will be considered further in the remaining sections of this opinion. Critical habitat has not been designated for the RCW, therefore none would be affected.

ENVIRONMENTAL BASELINE

Status of the species within the action area

The lowest number of active clusters and PBGs occurred in 1995 (see table below). The population began to recover in 1996 and has continued an overall pattern of growth since. Banding of individuals began in fall 1993 and the entire population has been banded since spring 1994. There have been 82 RCWs translocated (inter-population and intra-population) at Fort Jackson from 1994-2011. These have contributed to the growth of Fort Jackson's RCW population.

Currently, Fort Jackson's RCW population has grown from 24 active clusters in breeding season 2000 to 37 active clusters in 2012. This population size is considered relatively small. RCW management efforts consistent with the Guidelines and the Recovery Plan will be implemented to increase the number of potential breeding groups on Fort Jackson and to remain in compliance with the ESA.

Fort Jackson RCW population data from 1994-2012

Year	Number of Active Clusters	Percent Growth	Number of Potential Breeding Groups	Percent of Active Clusters with Potential Breeding Group
1994	13	No Data	7	54
1995	10	-23.10	7	70
1996	13	30.00	11	85
1997	14	7.69	12	86
1998	13	-7.14	12	92
1999	17	30.77	15	88
2000	17	0.00	17	100
2001	22	29.41	22	100
2002	25	13.64	25	100
2003	29	16.00	22	76
2004	33	13.79	23	70
2005	33	0.00	20	61
2006	34	3.03	26	76
2007	34	0.00	29	85
2008	35	2.94	23	66
2009	35	0.00	26	68
2010	36	2.86	25	69
2011	36	0.00	31	86
2012	37	2.78	32	86

Factors affecting species environment within the action area

Fort Jackson is the most active Initial Entry BCT installation in the U.S. Army. The installation is subdivided into more than 130 training areas, two restricted impact areas, and two cantonment areas. The West Impact Area is approximately 4,412 acres, the EIA is approximately 5,741 acres, and other Mission Required Areas total approximately 8,787 acres. Approximately 6,302 acres are cantonment areas, which include military housing, administrative offices, community facilities, medical facilities, industrial facilities, maintenance facilities, and supply/storage facilities for Fort Jackson and the South Carolina Army Nation Guard's McCrady Training Center. Approximately 32,836 acres are forested and are considered current or potential habitat for the RCW.

EFFECTS OF THE ACTION

This section includes an analysis of the direct and indirect effects of the proposed action on the species and its interrelated and interdependent activities. Under section 7(a) (2) of the ESA, effects of the action refers to the direct and indirect effects of an action on the species, together with the effects of other activities that are interrelated or interdependent with that action, the effects of the proposed action are added to the environmental baseline to determine the future baseline which serves as the basis for the determinations in this document.

The Service has determined that that there are no interrelated or interdependent actions apart from the action under consideration. The ESMC forms a general planning document that provides management goals and actions for the RCW. All project-level activities will undergo NEPA and section 7 consultations under the ESA when proposed.

Factors to be Considered

Potential effects to RCW due to the proposed action include a number of direct and indirect effects on the RCW and its habitat. Potential direct effects to the RCW or its habitat include: (1) direct mortality from fire; (2) harassment by the proposed action; and (3) missed foraging and breeding opportunities. Potential indirect effects include: (1) beneficial long-term improvements in habitat quality and increase in prey species and (2) temporary loss of cavity trees and foraging habitat.

Beneficial or No Effects

In 1994, approximately 13 RCW clusters historically occurred on Fort Jackson (ESMC, 2013). Based on the successful reestablishment of the population from 13 to 37 active clusters in the past 20 years due to habitat management and translocation, it can be expected that the same management actions, as detailed in the ESMC will continue to increase the population by the 5% annual goal.

Habitat management actions, such as mechanical or chemical midstory control, thinning, longleaf restoration, etc., as described in the ESMC, will ultimately be beneficial to the RCW population on Fort Jackson. These actions will create open park-like stands preferred by the

RCW. Protecting and leaving older pine trees during thinnings will be of value to the RCW. Protection of buffer areas around clusters will also be beneficial.

Monitoring the RCW population will have a beneficial effect by assisting in project-level analysis and by disclosing population size and trend information installation wide, which, in turn, dictates appropriate management changes. This information will be used to schedule and implement actions to correct, improve, or maintain suitable habitat conditions.

Providing recruitment clusters for the RCW, provisioning artificial cavities, augmenting and translocating birds will ultimately benefit the RCW population at Fort Jackson.

Direct Effects

INJURY AND MORTALITY

The RCW nesting season is April through July, which coincides with the growing season (April through July), the optimal period recommended for prescribed fire. Growing season fires are most effective for hardwood reduction and establishment of herbaceous groundcover. Adult and juvenile RCW can avoid flames and smoke by fleeing the area. Protection of nest trees can be provided by limiting fire intensities around the trees by establishing firebreaks or cutting down surrounding vegetation. However, there is the potential that nests with eggs or nestlings may be destroyed during prescribed burns and suppression activities despite implementing protective measures. Fort Jackson will reduce the loss of nest trees by reducing fuel loads at the base of the tree by raking, mowing, and wetting cavity tree as needed. Additionally, Fort Jackson will reduce high fuel loads utilizing dormant season fires before application of growing season fires, adequately monitor cavity trees and foraging habitat post-fire to identify unusual stress or mortality of pines, and provision cavity inserts within 48 hours to replace cavities lost in the fire.

HARASSMENT

Noise associated with the proposed action could disturb the RCW where it exceeds ambient noise. Additionally, visual disturbance from personnel during the proposed action could disturb the RCW. These disturbances may result in affected individuals leaving refugia and becoming more vulnerable to predation.

BREEDING AND FORAGING

Disturbance from increased human presence within the action area may also result in missed foraging and mating opportunities; however, this is difficult to estimate. Birds may be temporarily displaced from foraging, resting, singing, or incubating eggs by this activity. The disturbance is anticipated to be temporary and discountable.

Indirect effects

LOSS OF CAVITY TREES

The temporary loss of RCW cavity trees during prescribed fire or wildfire may result in the reduction of breeding and foraging opportunities within active clusters and temporary disturbance to the birds until an artificial cavity insert can be installed. Missed breeding opportunities may lead to a decrease in overall nesting success if birds do not re-nest. However, fire is essential to maintaining suitable habitat for RCW and is expected to provide a net conservation benefit for the species over the long term.

SPECIES' RESPONSES TO THE PROPOSED ACTION

Prescribed burning and wildfire can result in injury or mortality of nestlings or eggs, and can destroy cavity trees. Loss of cavity trees from burning may also adversely affect birds by possibly causing them to miss foraging and mating opportunities. The proposed action will not result in conversion of habitat; thus, the Service expects the number of birds within the action area to be similar or increased after the vegetation and prey species have recovered. The proposed action is expected to have long-term beneficial effects to the species because of the restoration and habitat-sustaining nature of the management activity.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. Because Fort Jackson is a self-governing entity, no cumulative effects are expected. However, increased development activity near Fort Jackson will likely require a Federal permit, technical assistance, etc., and will therefore undergo future interagency consultation. Future activities may adversely impact unknown populations of federally listed species.

After reviewing the current status of the RCW, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the implementation of the project as proposed is not likely to jeopardize the continued existence of the species. We anticipate limited mortality of RCW nests and nest trees from wildland fire activities. The proposed action will be directed towards maintaining and enhancing the diversity of the longleaf habitat within the action area. Where these goals are achieved, RCW will directly benefit because of improved habitat conditions. The action will not substantially reduce the numbers, distribution, or reproduction of RCW.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is

defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Under the terms of section l(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered to be a prohibited taking under the ESA, provided that such taking is in compliance with the terms and conditions of this incidental take statement. The measures described below are non-discretionary, and must be undertaken so that they become binding conditions of any grant or permit issued to Fort Jackson, as appropriate for the exemption in section 7(o)(2) to apply.

AMOUNT OR EXTENT OF TAKE ANTICIPATED

Habitat occupied by the RCW will be burned using careful planning and conservation measures, such as identification of cavity trees and raking or burning around cavity trees prior to conducting the prescribed burns. The measures used by the Fort Jackson will minimize the risk of losing nest trees and birds; however, there remains a possibility fire could accidentally destroy cavity trees or injure or kill birds. Therefore, in coordination with Fort Jackson, the Service anticipates the incidental take of 2 groups of RCWs will be taken as a result of prescribed fire. Additionally, take for all groups in the LMA (9) is anticipated due to munitions being fired into this area and the limited ability to access this area.

EFFECT OF THE TAKE

In the accompanying Biological Opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to these species or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the impacts of incidental take of RCWs at Fort Jackson.

(1) Avoid damaging, destroying, or felling pine trees in size and age classes that serve as foraging or potential nesting substrate and minimize tree loss throughout all RCW habitat management areas on Fort Jackson.

(2) Following prescribed burning activities and wildfires, all managed RCW clusters will be inspected for RCW management on the installation. If any RCW suitable cavities are found to be damaged to the point that they can no longer be used, each damaged cavity will be replaced by creating an artificial cavity in close proximity as soon as qualified personnel can be mobilized and on the site.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, Fort Jackson must comply with the following terms and conditions, which implement the reasonable and prudent measures, described above and outline required /monitoring requirements. These terms and conditions are non-discretionary and shall be incorporated into ESMC management agreements.

(1) Ensure, via all management plans and contracts or agreements for management, that specific emphasis is placed on the importance of protecting all natural and artificial RCW cavity trees, as well as other old-growth and flattop pines as potential cavity trees.

(2) Post burn monitoring will take place in all managed, active RCW clusters following prescribed burning activities and wildland fire events. If any cavity trees are damaged to the point that they can no longer be used, Fort Jackson will replace that tree by creating an artificial cavity in close proximity as soon as qualified personnel can be mobilized and on the site. Every effort will be put forth to keep mobilization time to less than 48 hours.

Upon locating a dead, injured, or sick individual of an endangered or threatened species, initial notification must be made to the Fish and Wildlife Service Law Enforcement Office at 176 Croghan Spur Road, Suite 200, Charleston, South Carolina 29407 (843) 727-4707 x 204. Additional notification must be made to the Fish and Wildlife Service Ecological Services Field Office at 176 Croghan Spur Road, Suite 200, Charleston, South Carolina 29407 (843) 727-4707 x 226. Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes that no more than of 2 individual RCWs and/or 2 active cavity trees and all clusters within the LMA (9) (due to the presence of UXO) will be incidentally taken. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help carry out recovery plans, or to develop information. There are no readily identified conservation actions that can be incorporated at this time.

REINITIATION NOTICE

This concludes formal consultation on this action as outlined in the request for formal consultation on this action. As written in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Service involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded (2 individuals and 9 clusters); (2) new information reveals effects of the Service's action that may impact listed species or critical habitat in a manner, or to an extent not considered in this biological opinion; (3) the Service's action is subsequently modified in a manner, or to an extent not considered in this biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

The Service greatly appreciates the cooperation of the Fort Jackson Wildlife Branch during this consultation. If you have any questions regarding this biological opinion, please contact Ms. Paula Sisson at (843) 727-4707 ext. 226, and reference FWS Log No. 2013-F-0207.

Sincerely,

Thomas D. McCoy

for Jay B. Herrington
Field Supervisor

JBH/PTS

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
176 Croghan Spur Road, Suite 200
Charleston, South Carolina 29407

December 11, 2013

Mr. Douglas M. Morrow
Chief, Wildlife Branch
Fort Jackson Army Training Base
Building 2563
Fort Jackson, SC 29207

Re: Amended Biological Opinion for the Fort Jackson Endangered Species Management Component
Fort Jackson Army Training Base, South Carolina
FWS Log No. 2013-F-0207

Dear Mr. Morrow:

The U.S. Fish and Wildlife Service has made an edit to the incidental take statement within the final biological opinion for the Endangered Species Management Component (U.S. Department of the Army, 2013) and its impacts on the red-cockaded woodpecker (*Picoides borealis*). The edit occurs on page 39 of the biological opinion, under the paragraph entitled, AMOUNT OR EXTENT OF TAKE ANTICIPATED. A copy of this page is enclosed.

The Service greatly appreciates the cooperation of the Fort Jackson Wildlife Branch during this consultation. If you have any questions regarding this biological opinion, please contact Ms. Paula Sisson at (843) 727-4707 x 226, and reference FWS Log No. 2013-F-0207.

Sincerely,

Thomas D. McCoy

Thomas D. McCoy
Acting Field Supervisor

Enclosure

TM/PTS

defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Under the terms of section l(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered to be a prohibited taking under the ESA, provided that such taking is in compliance with the terms and conditions of this incidental take statement. The measures described below are non-discretionary, and must be undertaken so that they become binding conditions of any grant or permit issued to Fort Jackson, as appropriate for the exemption in section 7(o)(2) to apply.

AMOUNT OR EXTENT OF TAKE ANTICIPATED

Habitat occupied by the RCW will be burned using careful planning and conservation measures, such as identification of cavity trees and raking or burning around cavity trees prior to conducting the prescribed burns. The measures used by the Fort Jackson will minimize the risk of losing nest trees and birds; however, there remains a possibility fire could accidentally destroy cavity trees or injure or kill birds. Therefore, in coordination with Fort Jackson, the Service anticipates the incidental take of 2 groups of RCWs will be taken as a result of prescribed fire or wildfire. Additionally, take for all groups in the LMA (9) is anticipated due to munitions being fired into this area and the limited ability to access this area.

EFFECT OF THE TAKE

In the accompanying Biological Opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to these species or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the impacts of incidental take of RCWs at Fort Jackson.

(1) Avoid damaging, destroying, or felling pine trees in size and age classes that serve as foraging or potential nesting substrate and minimize tree loss throughout all RCW habitat management areas on Fort Jackson.

(2) Following prescribed burning activities and wildfires, all managed RCW clusters will be inspected for RCW management on the installation. If any RCW suitable cavities are found to be damaged to the point that they can no longer be used, each damaged cavity will be replaced by creating an artificial cavity in close proximity as soon as qualified personnel can be mobilized and on the site.

APPENDIX F

Five Year Red-cockaded Woodpecker Habitat Management Plan

The purpose of this appendix is to describe habitat analysis procedures for the red-cockaded woodpecker (RCW) Habitat Management Unit (HMU) on Fort Jackson, detail results of the analysis, and detail a 5-year plan for habitat improvement in the RCW HMU. This analysis and plan will guide management decisions with the goal of bringing all current RCW foraging partitions, and any that are planned for the next 5 years, up to the Standard for Managed Stability (MS). The management actions detailed are the minimum actions required to meet the goal of bringing all RCW foraging partitions up to MS. Additional treatments may be scheduled within the next 5 years in order to meet the Recovery Standard (RS) for Good Quality Foraging Habitat (GQFH). For more information on the standards for MS and RS and details on GQFH, see the RCW Recovery Plan, Second Revision (USFWS 2003). In addition to the management activities described below, restoration activities are scheduled for stands of off-site pines. Management prescriptions for these stands are covered in Appendix G of the RCW Endangered Species Management Component (ESMC).

Fort Jackson completed an update to the forest inventory in 2011. The inventory covered most of the Standard Density Management Area (SDMA) of the RCW HMU. The Limited Management Area (LMA) was not inventoried due to safety and access constraints. Surrogate data for the stands in the LMA are currently being evaluated with an expected completion date in Fiscal Year (FY) 2013. Because data are not complete for the LMA, and because safety constraints limit habitat management, this analysis and 5-year plan are for clusters and habitat in the SDMA. Habitat management in the LMA consists of prescribed fire on a 1-3 year rotation, typically during the growing season. For further information on management within the LMA see Section 7.1 of the ESMC. Cavity maintenance and management are not covered in this plan. Information on cavity management can be found in Section 5 of the ESMC.

For the analysis, the latest forest inventory was uploaded into an ArcGIS database and converted for use with the RCW Foraging Matrix Tool (Matrix). All existing RCW clusters plus any planned for the next 5 years were then analyzed using the Matrix. Forty-six existing clusters and ten planned recruitment clusters were analyzed. The 9 clusters in the LMA were not analyzed. Of the 56 clusters analyzed, 28 met MS and 28 did not (Figure 1). The 28 clusters not meeting MS were then analyzed at the partition level to determine actions necessary to bring the partition up to MS. It was determined that one of the clusters not meeting MS would meet MS after the inventory data were updated to reflect thinning operations that happened in FY12. This cluster was removed from the prioritization scheme (REC-A). It was determined that the partition for another cluster (13D-A) would be unable to meet MS in the near future because of proximity to the LMA and the distribution of young pine plantations surrounding the cluster. We will request deletion of this recruitment cluster. This cluster was created in 2007 after the discovery of a pioneered start in the vicinity. A RCW was observed in the area 2 times in 2007 but never observed roosting in the cluster. The natural start has since died as a result of wildfire, and the artificial cavities have never been activated. No RCWs have been observed in the area since 2007.

The remaining 26 clusters were then prioritized based on current status and acreage of forage meeting MS. Additionally, breeding productivity for active clusters and schedule for creation of recruitment clusters were considered. Vacant recruitment clusters on the landscape were given a high priority in order to facilitate population expansion. Additionally, active clusters occupied by solitary males or breeding groups with poor reproductive success were given the highest priority for treatment. While all of these factors were used to determine priority, logistical considerations were also used. For example, if mechanical treatments were scheduled in FY14 for a high priority partition, it is likely that all stands within the management unit needing treatment were scheduled, even if they were part of a lower priority partition. Logistical considerations were used because it is more efficient to treat all areas within a management unit at once rather than treat scattered stands in multiple management units.

Based on this evaluation, approximately 4,696 acres have been scheduled for treatment in the next 5 years (Figure 2, Table 1). Chemical treatments are scheduled for 385 acres, mechanical treatment for 2,589 acres, and 1,722 acres are scheduled to be thinned. This analysis identifies a minimal amount of work to be completed to bring all partitions up to MS within the next 5 years. While treatments are being conducted in a particular management area, additional treatments within that management unit may be scheduled. This is especially true for thinning. Typically all stands within a particular management unit that need to be thinned will be thinned at the same time. Stands are thinned to meet RS guidelines whenever possible. In addition to these management activities, restoration activities in off-site pine stands are scheduled for another 1,441 acres. These management actions are described in detail in Appendix G of the ESMC.

Hardwood midstory data are somewhat subjective in nature and are prone to more error than standard inventory data. When possible, evaluations of stand conditions and prioritization of treatment were based on a combination of the hardwood midstory value as measured during the inventory and the RCW biologist's knowledge of the stand conditions. However, this approach was limited somewhat by the biologist's knowledge of stands in infrequently visited portions of the property. For these stands only the inventory value was used. Based on values recorded during the inventory as compared with known conditions of stands, we have concluded that hardwood midstory values recorded during the inventory are often worse than would have been recorded by an RCW biologist. For this reason it is likely that a number of stands prioritized for midstory treatment will not need to be treated, or that only portions of the stand will need to be treated. Alternatively, a stand identified for mechanical treatment may be deemed more suitable for chemical treatment of hardwood midstory. All treatment prescriptions will be field verified by a wildlife biologist or technician in the FY leading up to the proposed treatment.

Several additional factors will be considered when scheduling management activities and those activities will be scheduled in close coordination with other natural resource management activities. If an area scheduled to be treated is scheduled to be burned in any fiscal year, the treatment priority will move up for treatments to occur the following year. For example, if treatment area A is scheduled for FY15 but is burned in FY13, the area will be evaluated to see if mechanical treatment is still necessary. If mechanical treatment is warranted, that treatment block will be prioritized for treatment later in FY13 or in FY14, depending on the timing of the

burn. An annual review of completed treatments and priorities for the following year will be conducted, to include analyzing all affected foraging partitions to determine whether habitat management goals were met. This information will be used to annually update the 5-year work plan. Ultimately, prescribed fire will be used to manage, maintain and enhance the RCW HMU. The prescribed fire goal for these and all HMU stands is to burn on a 1-3 year rotation during the growing season. The use of chemicals and/or mechanical treatments will be carefully considered due to the potential impact on native groundcover restoration.

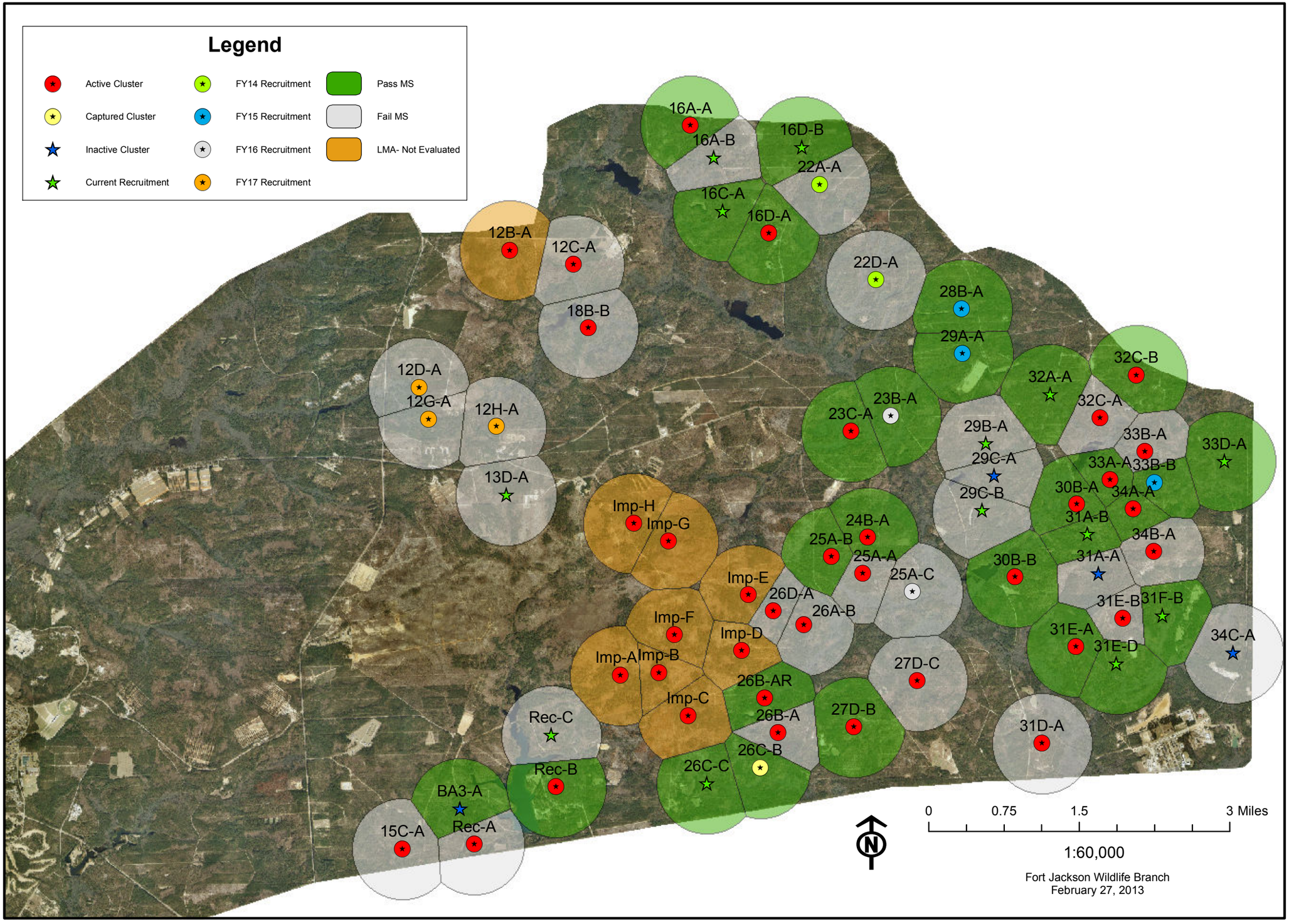
Year	Treatment	Management Units	Acreage	Affected Partitions
FY13	Chemical	TA15C, TA26A, TA27D, TA27E, BA3	154	15C-A, 26A-B, 26D-A, 27D-C
FY13	Mechanical	TA15A, TA15B, TA15C, TA22A, TA22B, TA22C, TA22D, TA22E, TA26A, TA26D, TA26E, TA28A, TA28B, TA30A	786	15C-A, 16D-A, 16D-B, 22A-A, 22D-A, 25A-B, 25A-D, 26A-B, 26D-A, 28B-A, 29C-A, 29C-B, 30B-A, 30B-B, IMP-D, IMP-E
FY13	Thin	TA25C, TA26B, TA26E, TA27A, TA27C, TA27D	306	25A-A, 25A-C, 26B-AR, 27D-B, 27D-C, IMP-D
FY13 Total			1,246	
FY14	Chemical	TA12F, TA12G, TA13E, TA26B, TA27D, TA27E, TA28A	231	12G-A, 12H-A, 13D-A, 22D-A, 26B-A, 26B-AR, 27D-B, 27D-C
FY14	Mechanical	TA16A, TA16C, TA18B, TA18D, TA26B, TA26C, TA27C, TA27D, TA34B, TA34C, WLR2	530	16A-A, 16A-B, 18B-B, 18B-C, 26B-A, 26B-AR, 26C-B, 27D-B, 34C-A, REC-C, IMP-C
FY14	Thin	TA14C, TA15A, TA15B, TA15C, ASP, BA3	237	15C-A, BA3-A
FY14 Total			998	
FY15	Mechanical	TA24E, TA25A, TA25C, TA27A, TA27D, TA31A, TA33E, TA34A	404	25A-C, 27D-C, 30B-B, 31A-A, 31A-B, 34A-A, 34B-A
FY15	Thin	TA27B, TA31A, TA31B, TA31C, TA31D, TA31F, TA34B, TA34C, TA35A, TA35B	460	31A-A, 31D-A, 31E-A, 31E-B, 31F-B, 34B-A, 34C-A
FY15 Total			864	
FY16	Mechanical	TA11D, TA12C, TA12D, TA12F, TA12G, TA12H, TA27B, TA27F, TA28D, TA29A, TA29B, TA32B, TA33A, TA33B, TA33C, TA33D	492	12B-A, 12C-A, 12D-A, 12G-A, 12H-A, 27D-C, 29A-A, 29B-A, 31D-A, 32A-A, 32C-A, 32C-B, 33A-A, 33B-A
FY16	Thin	TA22D, TA24D, TA25B, TA29B, TA29C	296	22D-A, 25A-C, 29B-A, 29C-A, 29C-B
FY16 Total			788	
FY17	Mechanical	TA3C, TA3D, TA3E, TA4A, TA4B, TA4C, TA5A	377	Future recruitment sites
FY17	Thin	TA5B, TA12C, TA12D, TA12E, TA12F, TA12G, TA13D, TA13E, TA18A	423	12C-A, 12D-A, 12G-A, 12H-A, 13D-A, 18B-B, 18B-C
FY17 Total			800	
TOTAL			4,696	

Table 1. 5-year schedule of management activities within the RCW HMU on Fort Jackson, SC.

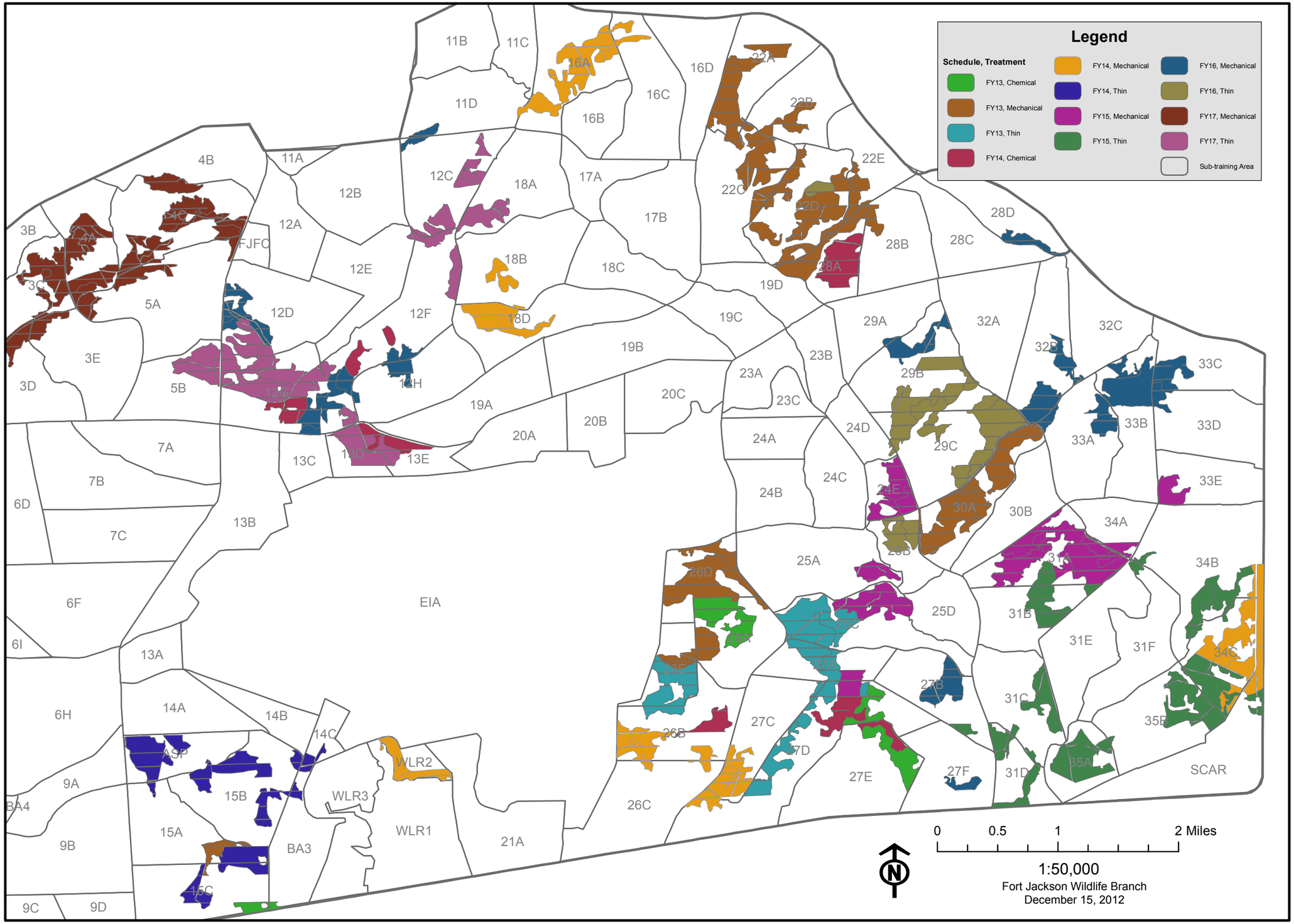
Literature Cited

U.S. Fish & Wildlife Service. 2003. Recovery Plan for the Red-cockaded Woodpecker (Picoides borealis) Second Revision. Atlanta, GA. 88 pp.

Appendix F Figure 1: Fort Jackson, SC RCW Foraging Partitions



Appendix F Figure 2: Fort Jackson, SC 5 Year Treatment Plan



APPENDIX G

Plan for Restoration of Native Canopy Pines

The purpose of this appendix is to detail timelines and prescriptions for restoration of off-site pines and scrub oak stands on Fort Jackson to longleaf pine stands. The priority for restoration has and will continue to be the conversion of poorly growing off-site slash pine to longleaf pine. However, a small amount of scrub oak will be restored to longleaf over the next 5 years. Additionally, some restoration activity will take place in loblolly pine stands in the next 5 years. Details for each of the stand types are given below.

Slash Pine Stands

Between 1953 and 1974 slash pine was planted on over 7,500 acres on Fort Jackson. The majority of this acreage has since been restored to longleaf pine. However, approximately 1,400 acres of slash pine plantations remain on Fort Jackson. Most of these areas are represented by poorly growing, malformed slash pine that even after 40 or more years of growth fail to meet the standards to serve as forage for the Red-cockaded Woodpecker (RCW). Restoration of these stands will be accomplished using a number of techniques depending on the current forest structure and health, the overall pattern of pine species and age distribution at the local and landscape level, and the necessity of the stand to serve as forage and/or dispersal habitat for the RCW. Restoration will be accomplished as follows:

1. Thinning: The first category of stands are those that are growing vigorously and have the proper size and age structure to serve as RCW foraging habitat. At a minimum, these stands will be thinned to meet Managed Stability (MS) guidelines. When possible the stands will be thinned to meet the Recovery Standard (RS). For more information on the standards for MS and RS, see the RCW Recovery Plan, Second Revision (USFWS 2003). Prescribed fire will be reintroduced or maintained in these stands. These stands will not be converted until most of the young longleaf pine planted in recent years develops the proper structure to serve as RCW foraging habitat, or until the health of the stand declines to the point that it is necessary to convert the stand. Ten stands covering approximately 229 acres will be treated in this manner (Figure 1, Table 1).
2. Thinning plus underplanting with longleaf: The second category of stands are those that may or may not have the proper structure to serve as forage for RCWs but are necessary for existing RCW foraging partitions or for habitat contiguity. These stands will have most or all of the small slash pines (less than 10”) removed through thinning and will be underplanted with longleaf pine. Some natural regeneration may also occur, as many of these stands have at least some longleaf pine in the overstory. Prescribed fire will be introduced or maintained in these stands to promote the long-term conversion of the site

to longleaf pine. Twenty-three stands covering approximately 749 acres are scheduled to be thinned and underplanted over the next 5 years (Figure 1, Table 1).

3. Mechanical treatment: Two stands covering approximately 97 acres have suitable overstory structure to be counted as forage and appear to be healthy at this time. However, these stands have dense pine and/or hardwood midstory. Both stands are in the foraging partitions for active RCW clusters. These stands are scheduled for mechanical treatment in FY13 and FY14 (Figure 1, Table 1). They will be cleared of small pines and the hardwood midstory using either tractor-drawn mowers or tracked or rubber-tired cutters with front or rear mounted rotary drum severe duty flail cutter heads or fixed tooth mulching/cutter heads. Prescribed fire will be used to maintain the proper habitat structure once the mechanical treatment is complete. These stands will not be restored to longleaf until most of the young longleaf pine planted in recent years develops the proper structure to serve as RCW foraging habitat, or until the health of the stand declines to the point that it is necessary to convert the stand.
4. Mechanical treatment plus underplanting with longleaf: Four slash pine stands do not contain enough merchantable pine to be scheduled for thinning. These stands are scheduled for mechanical treatment over the next 5 years. They will be cleared of small pines and the hardwood midstory using either tractor-drawn mowers or tracked or rubber-tired cutters with front or rear mounted rotary drum severe duty flail cutter heads or fixed tooth mulching/cutter heads. Longleaf pine will be planted in the gaps created by the removal of small pines and hardwood. Approximately 119 acres will be treated in this manner (Figure 1, Table 1).
5. Remove slash pine and restore to longleaf: Twelve stands covering approximately 229 acres will have all the slash pine removed and restored to longleaf pine (Figure 1, Table 1). These stands are poorly growing and are not essential to RCW foraging and/or dispersal habitat, and are not necessary to maintain habitat contiguity.

Scrub Oak Stands

Based on the latest forest inventory, there are 60 stands covering 2,253 acres on Fort Jackson typed as scrub oak (Figure 2). Of these, 11 stands comprising 239 acres are in the West Impact Area (WIA) and are not in the RCW Habitat Management Unit (HMU). These stands are not considered to be manageable in the near future due to access limitations into the WIA. Forty-three of the stands are in the Limited Management Area (LMA) of the RCW HMU. Thirteen of these are in the Training Area 12 portion of the LMA and cover 608 acres. The remaining 30 stands are in the East Impact Area (EIA) and cover 1,349 acres. We are unable to conduct restoration activities in the LMA due to safety and access concerns. For more information on management in the LMA see Section 7.1 of the RCW Endangered Species Management Component (ESMC). Eight of the 9 remaining stands, totaling 55 acres, are scheduled for chemical treatment and restoration to longleaf in the next 5 years (Figure 2, Table 1). Stand 10139, totaling 2 acres, is near the boundary and may be affected by the Leesburg Road Widening Project. We have postponed restoration of this stand until the road widening

project is complete.

Loblolly Pine Stands

Fort Jackson currently has over 500 forest stands covering more than 12,000 acres for which loblolly pine is the dominant or co-dominant species. Loblolly stands cover over 8,700 acres within the Standard Density Management Area (SDMA) of the RCW HMU. Though loblolly pine is a native species in this area, it was historically planted in areas that would be considered off-site. Loblolly pine is less resistant to fire and more prone to disease than longleaf pine. Therefore, where appropriate, Fort Jackson will convert off-site loblolly pine stands to longleaf stands. Due to the extent of loblolly stands on Fort Jackson, this restoration will not be complete within the 5-year period of this plan. Remaining slash pine stands and scrub oak stands will take priority over loblolly conversion. Pine age distribution on Fort Jackson is skewed to younger pines (< 30 years old) due to the completed restoration of thousands of acres of slash pine to longleaf pine. Because of this skewed age distribution, the restoration of loblolly to longleaf will be a long process that takes the forest composition, the age and health of the forest, and the necessity for RCW foraging habitat or dispersal corridors into consideration. Restoration in loblolly pine stands for the next 5 years will primarily consist of thinning overstocked stands to open up the canopy and reintroducing or maintaining prescribed fire on a 1-3 year rotation. However, if deemed appropriate, any of the techniques described below may be employed over the next 5 years.

For planning purposes, the loblolly stands were broken down into treatment categories based on the considerations detailed above. Category 1 stands are mixed longleaf/loblolly pine stands that have sufficient numbers of well distributed longleaf pine in the overstory to provide some seed for natural regeneration. These stands will be converted slowly over time by selective thinning favoring longleaf, and by the reintroduction and/or continuation of prescribed fire to control the loblolly regeneration over time. If small gaps are naturally present, or are created by selective thinning, longleaf may be planted to facilitate the restoration of these stands. Stands with lower basal areas of pine will be managed primarily through fire and underplanting with longleaf if appropriate. Category 1 stands cover approximately 802 acres within the HMU. Within these stands, 220 acres are scheduled for thinning or mechanical treatment in the next 5 years (Figure 3, Table 1).

Category 2 stands are loblolly plantations. There are only 4 loblolly plantations on Fort Jackson covering approximately 65 acres. Of these, only 2 stands covering 31 acres are in the RCW HMU (Figure 4, Table 1). Stand 7068 is within an RCW foraging partition but is insignificant in size (approx. 1 acre). When timber operations are scheduled for this area, Stand 7006 will be clearcut and restored to longleaf. Stand 7006 is larger in size (approx. 30 acres) but is not within an existing RCW foraging partition. This stand is important for maintaining habitat contiguity within the area, and will be maintained until plantations in the area mature enough to serve as foraging habitat. This stand will receive priority for the reintroduction of prescribed fire.

Category 3 stands are natural pine stands dominated by loblolly pine. This category

includes 260 stands covering over 6,000 acres. Twenty-nine of these stands covering 470 acres are in the WIA and are not part of the HMU. Stands in the WIA will not be prioritized for restoration to longleaf pine in the near future due to safety and access constraints. Another 35 stands covering 454 acres are not in the RCW HMU. These stands are primarily in the Compartment 1 Management Area and in the Cantonment Areas. While access and safety constraints are less of a concern than in the WIA, these stands will not be prioritized for restoration because they are not part of the RCW HMU. The limited resources at Fort Jackson will be targeted at restoration in the RCW HMU. However, if there are scheduled timber operations in the vicinity of some the non-HMU stands, they may be treated by one of the methods detailed below.

Removing the non-HMU stands from Category 3 leaves 195 stands covering approximately 5,000 acres (Figure 3). Restoration of these stands will follow one of the following options:

1. If sufficient numbers of well-distributed longleaf are present in the overstory, the stands will be thinned selectively to favor longleaf and fire will be used to control the loblolly regeneration. Additionally, chemical and/or mechanical treatment may be used to control both hardwood midstory and pine regeneration to promote natural regeneration of longleaf.
2. For stands without sufficient longleaf to promote natural regeneration; restoration will be conducted by removing the loblolly and planting to longleaf. Stands will be harvested when they are not essential to RCW foraging habitat or habitat contiguity. These restoration sites will not exceed 20 acres if they are within a mile of existing RCW clusters; for sites greater than 1 mile from an existing RCW cluster, the size of the treatment area may be as large as 40 acres. However, smaller patches will be cut whenever possible. Appropriate site preparation treatments will be conducted prior to planting.

For both options, prescribed fire will be used to help restore and maintain the proper habitat structure. Sixty-four Category 3 Stands covering approximately 1,782 acres have been scheduled for treatment over the next 5 years (Figure 3). The remaining 131 stands covering approximately 3,392 acres will be evaluated in the field and scheduled for treatment after the completion of this initial phase of restoration.

Category 4 stands are pine hardwood stands dominated by loblolly pine. There are 171 stands covering approximately 4,380 acres in this category. Twenty of these stands covering approximately 440 acres are in the WIA and are not part of the RCW HMU, and as stated above will not be prioritized for treatment. Another 67 stands covering approximately 1,393 acres are not in the RCW HMU. These stands are primarily in the Compartment 1 Management Area and in the Cantonment Areas, and will not be prioritized for treatment. Of the remaining 84 stands covering 2,544 acres, 16 stands covering approximately 705 acres have been scheduled for mechanical treatment over the next 5 years (Figure 3). One stand covering 28 acres was treated in FY12. Another 5 stands covering approximately 185 acres are scheduled to be thinned over the next 5 years (Figure 3). Three stands covering approximately 102 acres were thinned in FY12. The remaining 59 stands cover approximately 1,524 acres. Other than the reintroduction

and/or continuation of prescribed fire on a 1-3 year rotation, no restoration activities will be scheduled for these stands in the next 5 years. These stands will be evaluated in the field and scheduled for treatment after the completion of this initial phase of restoration.

Category 5 stands are pine scrub oak stands dominated by loblolly pine. There are 33 stands covering approximately 449 acres in this category. Eleven of these stands covering 191 acres are in the WIA and will not be prioritized for restoration. Another 8 stands covering 98 acres are not in the HMU and will not be prioritized for restoration. The remaining 14 stands cover approximately 205 acres. Nine of these stands covering 150 acres have been scheduled for mechanical or chemical treatment in the next five years (Figure 4, Table 1). The remaining stands will not be prioritized for treatment during the 5-year period of this plan.

STAND TYPE	TREATMENT	SCHEDULE	ACRES
Slash Pine	Thinning	FY13	37
		FY15	17
		FY16	48
		FY17	22
		FY18	105
	Total		229
	Thin and Underplant	FY14	270
		FY15	43
		FY16	163
		FY17	238
		FY18	35
	Total		749
	Mechanical	FY13	30
		FY14	67
	Total		97
	Mechanical plus Underplant	FY15	23
		FY16	35
		FY17	61
	Total		119
	Restoration	FY14	124
		FY16	21
		FY17	84
	Total		229
	SLASH PINE TOTAL		**1,423**
Scrub Oak	Chemical Treatment and Restoration	FY14	55
	SCRUB OAK TOTAL		**55**

Table 1. Treatment prescriptions and schedule for restoration of off-site pines and scrub oak on Fort Jackson, SC.

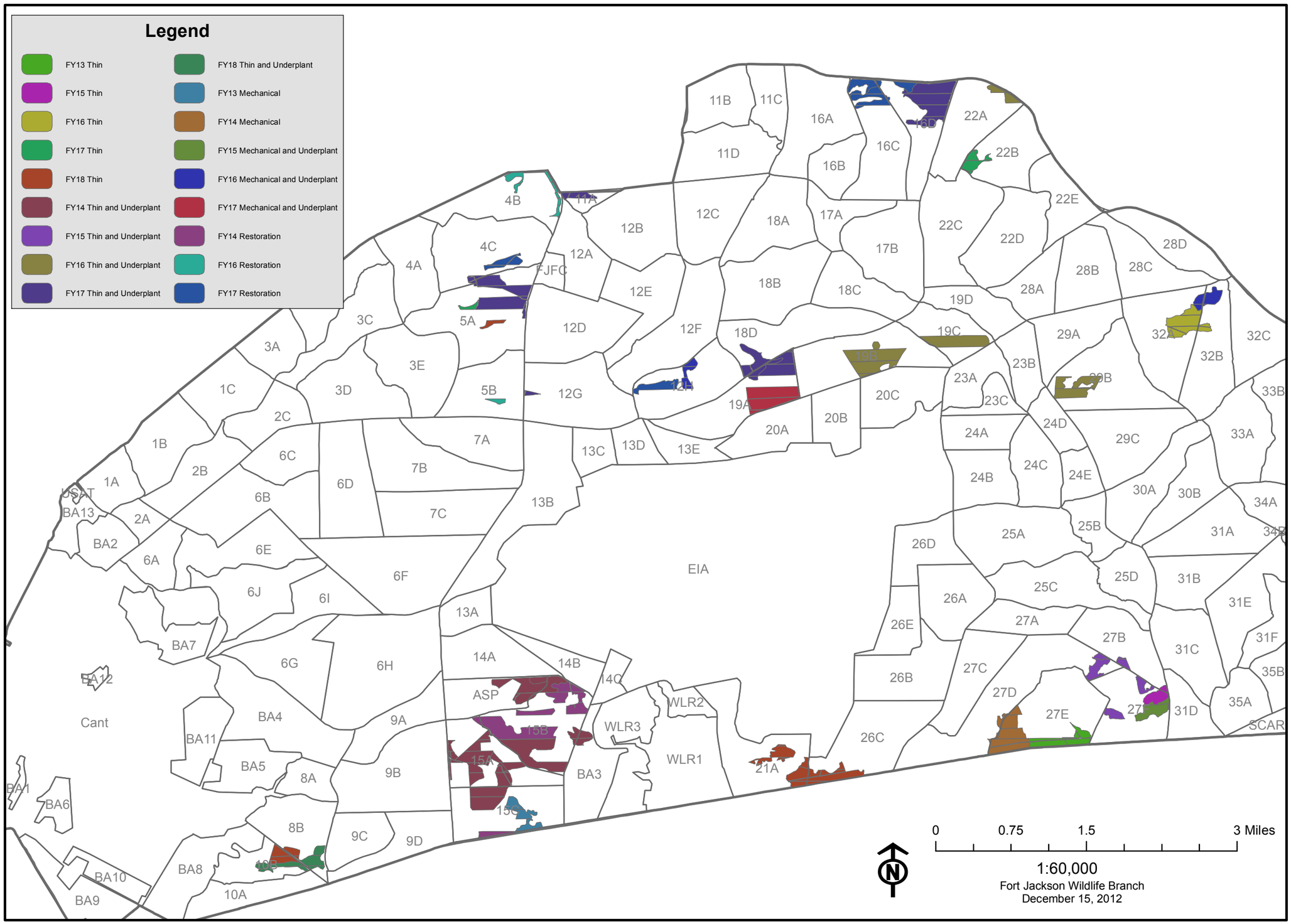
Loblolly Pine Stands	Category 1	Unscheduled	582
	Category 1 Thin	FY14	66
	Category 1 Thin	FY15	24
	Category 1 Mechanical	FY13	89
	Category 1 Mechanical	FY15	29
	Category 1 Mechanical	FY16	12
	Total		220
	CATEGORY 1 TOTAL		**802**
	Category 2 Maintain	Unscheduled	30
	Category 2 Restore	Unscheduled	1
	CATEGORY 2 TOTAL		**31**
	Category 3	Unscheduled	3,392
	Category 3 Thin	FY13	85
	Category 3 Thin	FY14	17
	Category 3 Thin	FY15	381
	Category 3 Thin	FY16	296
	Category 3 Thin	FY17	276
	Total		1,055
	Category 3 Mechanical	FY13	200
	Category 3 Mechanical	FY14	164
	Category 3 Mechanical	FY15	30
	Category 3 Mechanical	FY16	42
	Category 3 Mechanical	FY17	198
	Total		634
	Category 3 Chemical	FY14	93
	Total		93
	CATEGORY 3 TOTAL		**5,174**
	Category 4	Unscheduled	1,524
	Category 4 Thin	FY13	101
	Category 4 Thin	FY15	48
	Category 4 Thin	FY17	36
	Total		185
	Category 4 Mechanical	FY13	80
	Category 4 Mechanical	FY14	236
	Category 4 Mechanical	FY15	100
	Category 4 Mechanical	FY16	231
	Category 4 Mechanical	FY17	58
	Total		705
	CATEGORY 4 TOTAL		**2,414**
	Category 5	Unscheduled	
	Category 5 Mechanical	FY13	30
	Category 5 Mechanical	FY16	45
	Category 5 Mechanical	FY17	53
	Total		128
	Category 5 Chemical	FY14	23
	Total		23
	CATEGORY 5 TOTAL		**206**

Table 1, continued. Treatment prescriptions and schedule for restoration of off-site pines and scrub oak on Fort Jackson, SC.

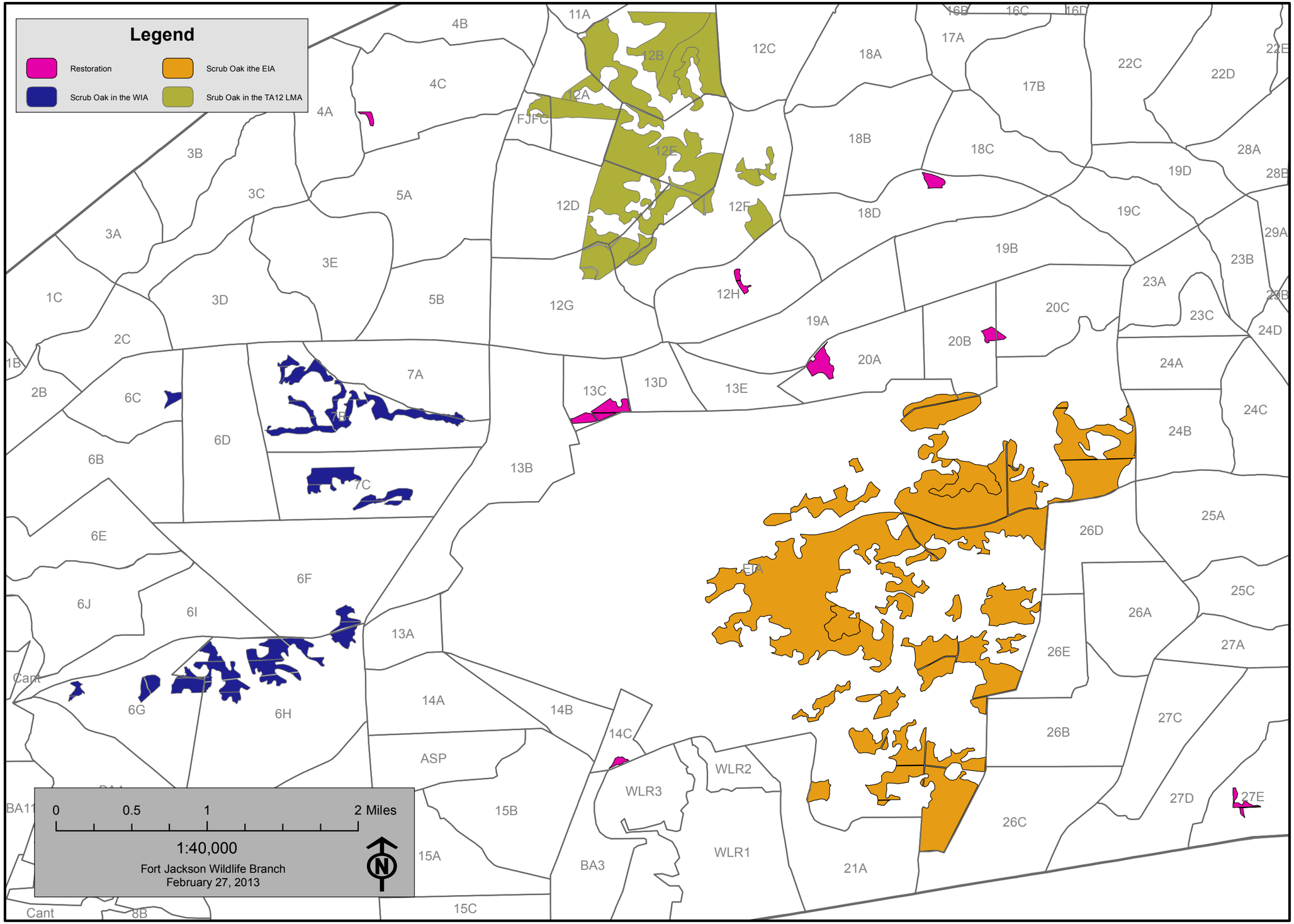
Literature Cited

U.S. Fish & Wildlife Service. 2003. Recovery Plan for the Red-cockaded Woodpecker (Picoides borealis) Second Revision. Atlanta, GA. 88 pp.

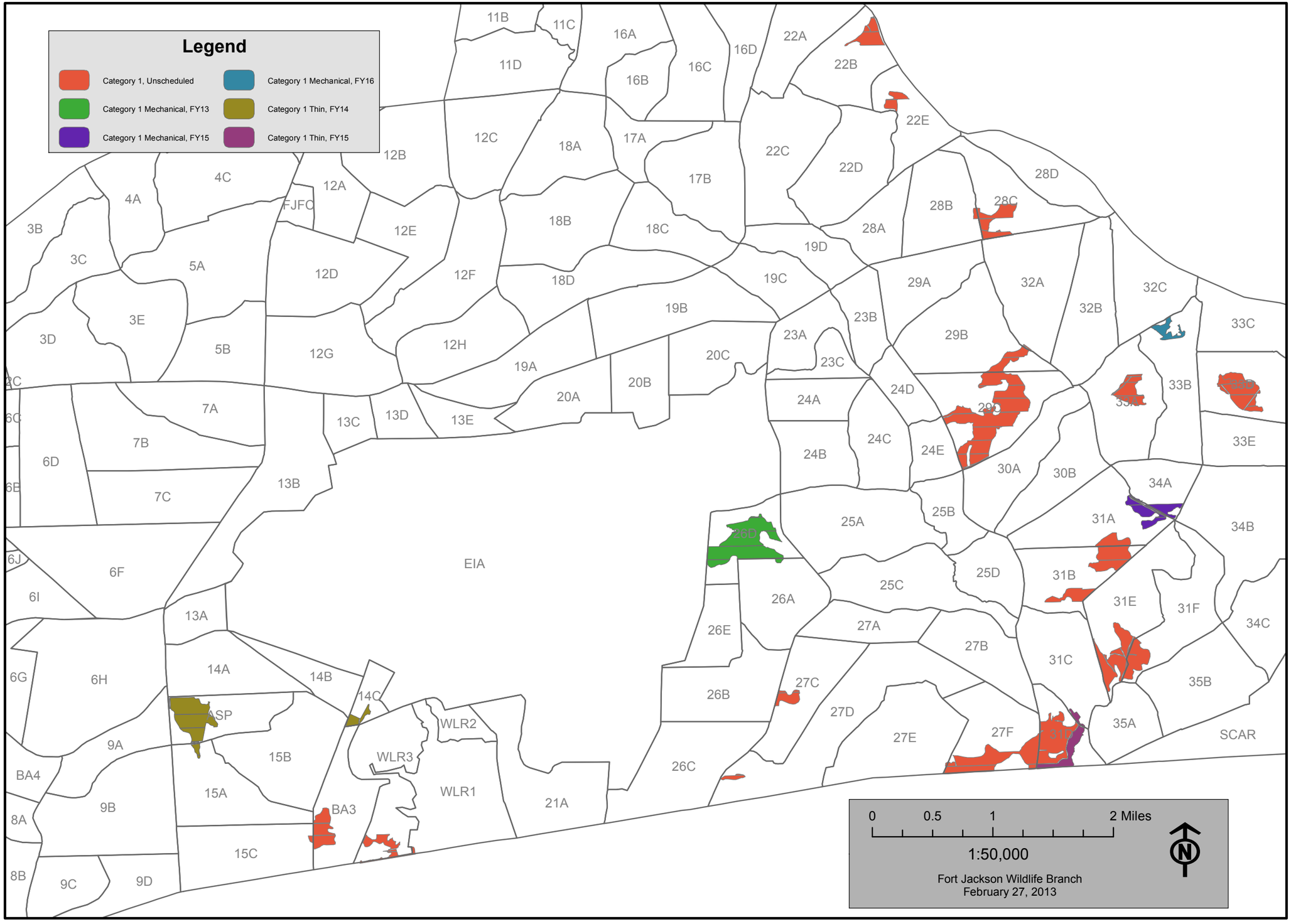
Appendix G Figure 1: Fort Jackson, SC Restoration Plan for Off-site Slash Pine



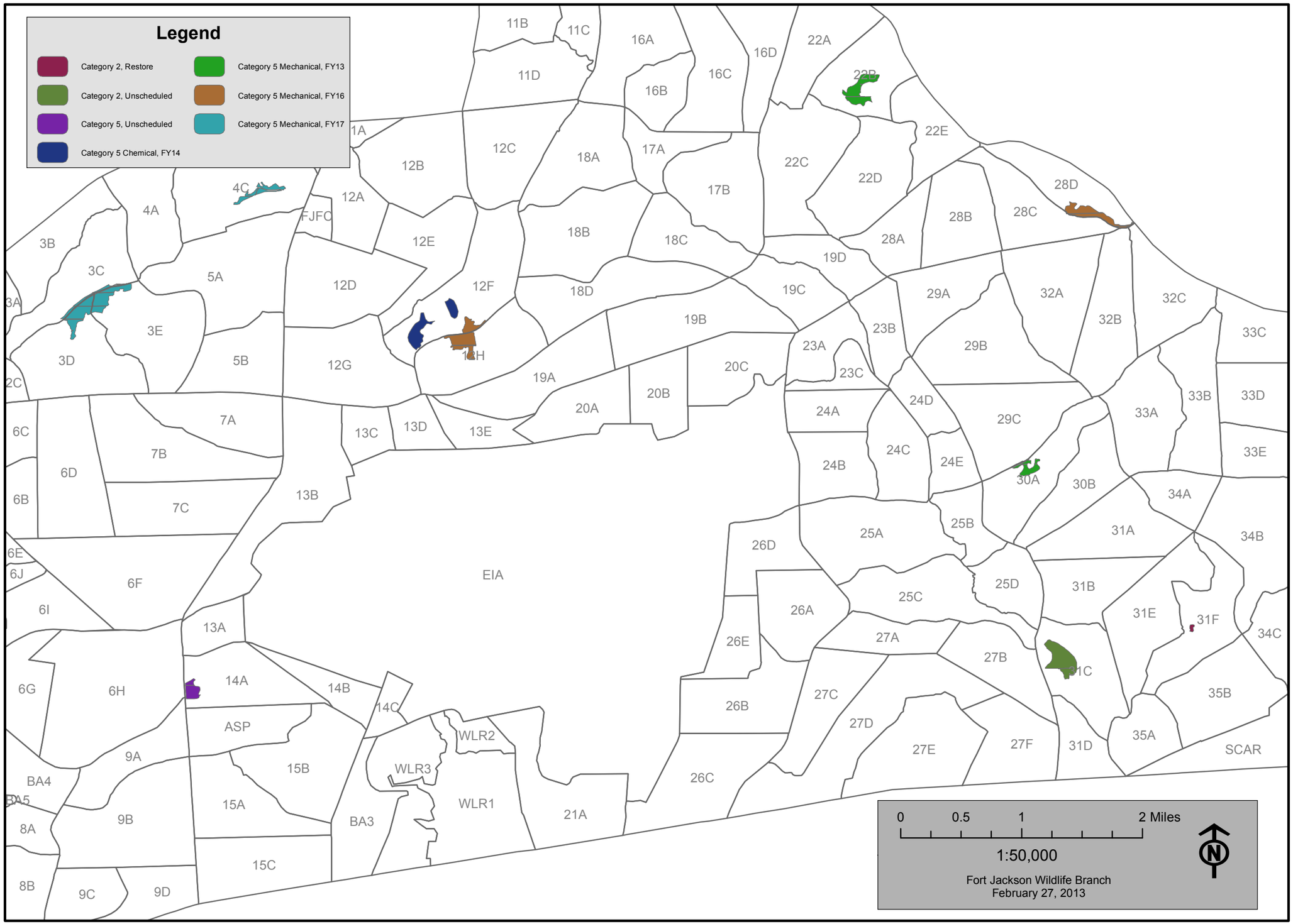
Appendix G Figure 2: Fort Jackson, SC Restoration Plan for Scrub Oak Stands



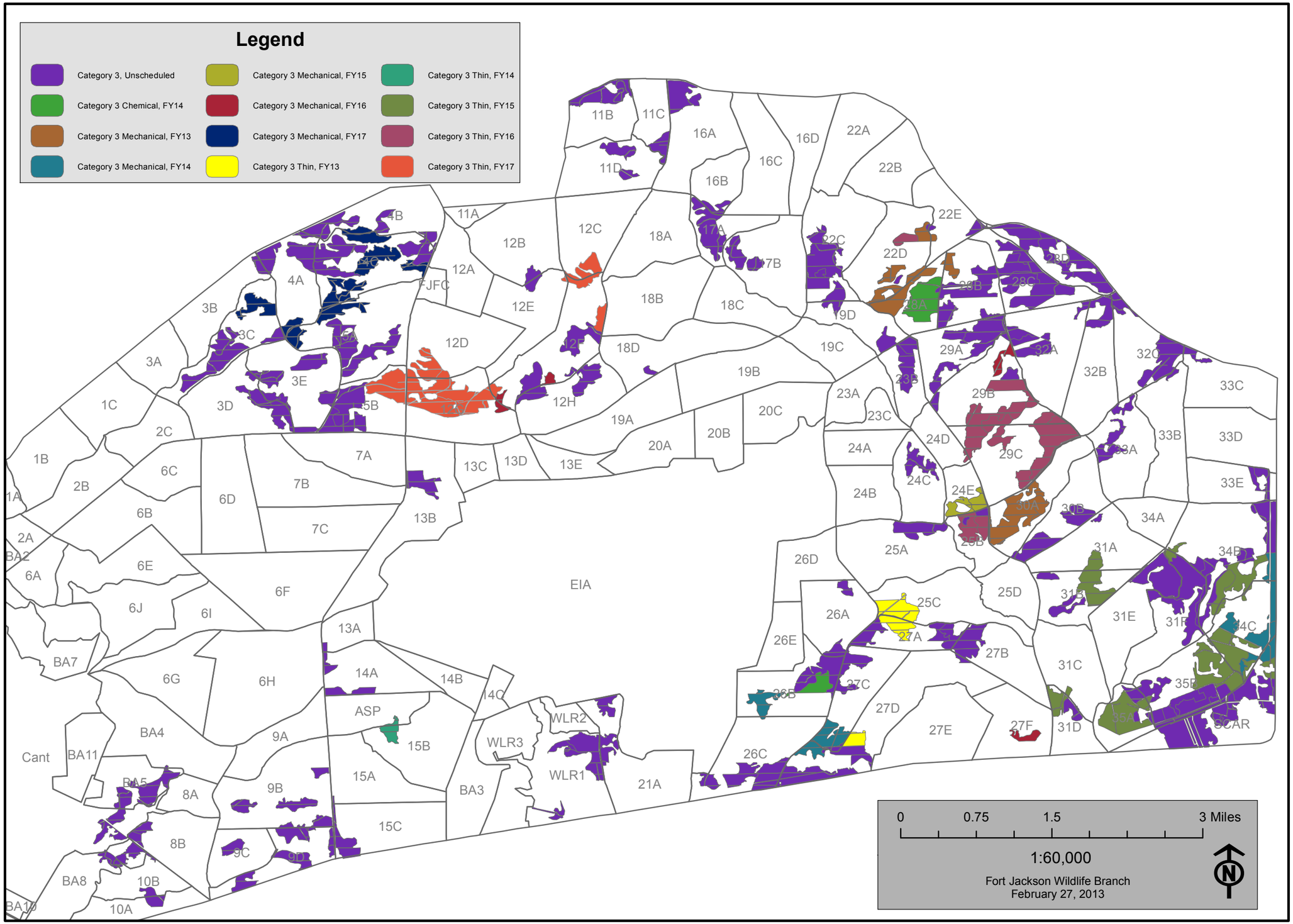
Appendix G Figure 3: Fort Jackson, SC Restoration Plan for Category 1 Loblolly Stands



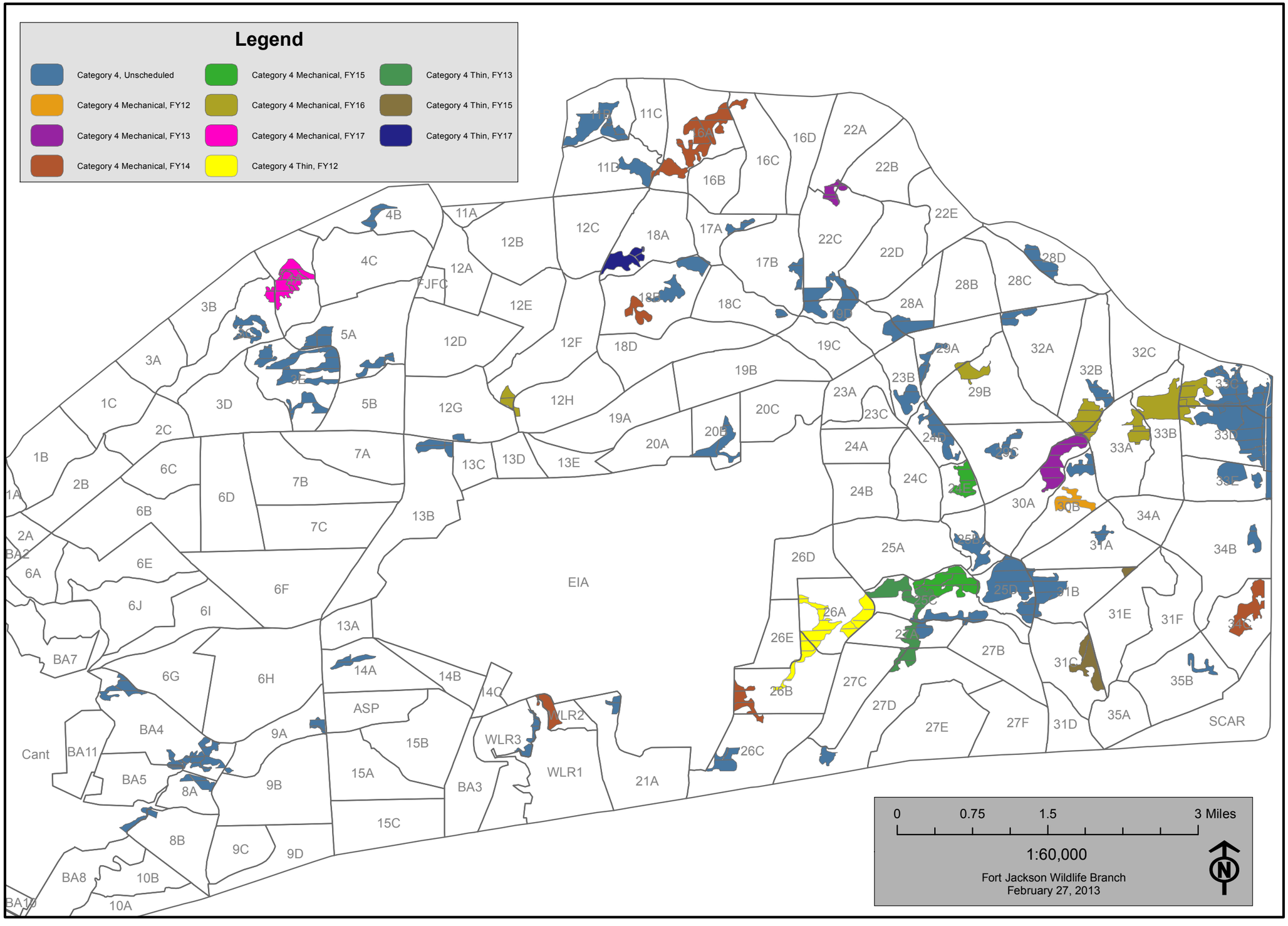
Appendix G Figure 4: Fort Jackson, SC Restoration Plan for Category 2 and Category 5 Loblolly Stands



Appendix G Figure 5: Fort Jackson, SC Restoration Plan for Category 3 Loblolly Stands



Appendix G Figure 6: Fort Jackson, SC Restoration Plan for Category 4 Loblolly Stands



ENDANGERED SPECIES MANAGEMENT COMPONENT FOR SMOOTH CONEFLOWER (*Echinacea laevigata)* AND ROUGH-LEAVED LOOSESTRIFE (*Lysimachia asperulaefolia)*

FORT JACKSON, SOUTH CAROLINA

Wildlife Branch
Environmental Division
Directorate of Public Works
Fort Jackson, SC 29207

5 March 2015

Approval Page

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A. Smooth Coneflower Monitoring Protocol

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Acronyms/Abbreviations

EIA	East Impact Area
EPR	Environmental Program Requirements
ESA	Endangered Species Act
ESMC	Endangered Species Management Component
INRMP	Integrated Natural Resources Management Plan
RCW	Red-cockaded Woodpecker
SCARNG	South Carolina Army National Guard
SCDNR	South Carolina Department of Natural Resources
USFWS	U.S. Fish and Wildlife Service
UXO	Unexploded Ordnance

Executive Summary

Requirement: Army Regulation 200-3 requires appropriate Army installations to prepare an Integrated Natural Resources Management Plan (INRMP). This Flora Endangered Species Management Component (ESMC) is a component of that plan that details how the installation will manage ESMC plant species on lands it manages that are federally listed as threatened or endangered.

Current Status: The smooth coneflower (*Echinacea laevigata*) and rough-leaved loosestrife (*Lysimachia asperulaefolia*) are federally listed as endangered by the United States Fish and Wildlife Service (USFWS).

Habitat Requirements and Limiting Factors: Limiting factors for smooth coneflower include the small population size, competition from other species, and lack of suitable habitat. The major limiting factor for rough-leaved loosestrife is the potential buildup of woody vegetation within its habitat due to a lack of fire.

Management Objectives: The objective of this ESMC is to protect and enhance the populations of these plant species as required by the Endangered Species Act of 1973 (ESA) as amended, while preserving training readiness and other mission requirements of Fort Jackson.

Cooperation: The ESMC was developed in cooperation with the USFWS.

Conservation Goals: The goal is to provide for and maintain a stable or increasing population of each of these species on Fort Jackson. Protecting and improving current habitat are essential.

Actions Needed: The major steps needed to reach the objectives and conservation goals are:

1) Protect existing populations from potential impacts.

2) Maintain or increase the population size of each species through implementation of management techniques.

3) Develop and maintain an effective prescribed burning program to improve existing and potential habitat.

4) Continue a monitoring program to determine the demographic trends of the population.

Estimated Cost of Conservation Actions: Environmental funds from an Environmental Program Requirements (EPR) project will support the implementation of this plan. Projected costs for the first five years of this plan are: Year 1) $7,612; Year 2) $5,648; Year 3) $7,732; Year 4) $3,924; Year 5) $7,372.

1.0 INTRODUCTION

Army Regulation 200-3 requires appropriate Army installations to prepare an INRMP. This ESMC is a component of that plan that details how the installation will manage ESMC plant species on lands it manages that are federally listed as threatened or endangered. This document is a revision of the ESMC that Fort Jackson prepared in March 2007 and the USFWS approved by submittal of a Biological Opinion dated April 23, 2007, (USFWS Log. No. 42410-2007-I-0395). This revision will be sent to the USFWS for comment as part of the ongoing informal consultation on the management of endangered and threatened plant species.

The objective of this ESMC is to conserve rare, threatened and endangered plant species as required by the ESA of 1973 as amended, while preserving military training readiness and other mission requirements of Fort Jackson. The purposes of this plan are to: (1) define conservation goals for smooth coneflower (*Echinacea laevigata*) and rough-leaved loosestrife (*Lysimachia asperulaefolia*), federally listed endangered plant species on Fort Jackson; (2) outline a plan for management of these plant species and their habitat that will enable achievement of conservation goals, and; (3) summarize the cost of conservation efforts and impacts on installation activities.

The recovery plans for rough-leaved loosestrife and smooth coneflower that have been developed by the USFWS include conservation measures that have been incorporated into this ESMC.

Fort Jackson is located in the sandhills region of central South Carolina in Richland County, adjacent to the city of Columbia (Figure 1). Fort Jackson has a relatively large population of rough-leaved loosestrife, which is protected to some degree because of its location in the East Impact Area (EIA). However, Fort Jackson's population of smooth coneflower is small and vulnerable to extirpation because the population has only a few individual plants. See Figure 2 below for general locations of the populations.

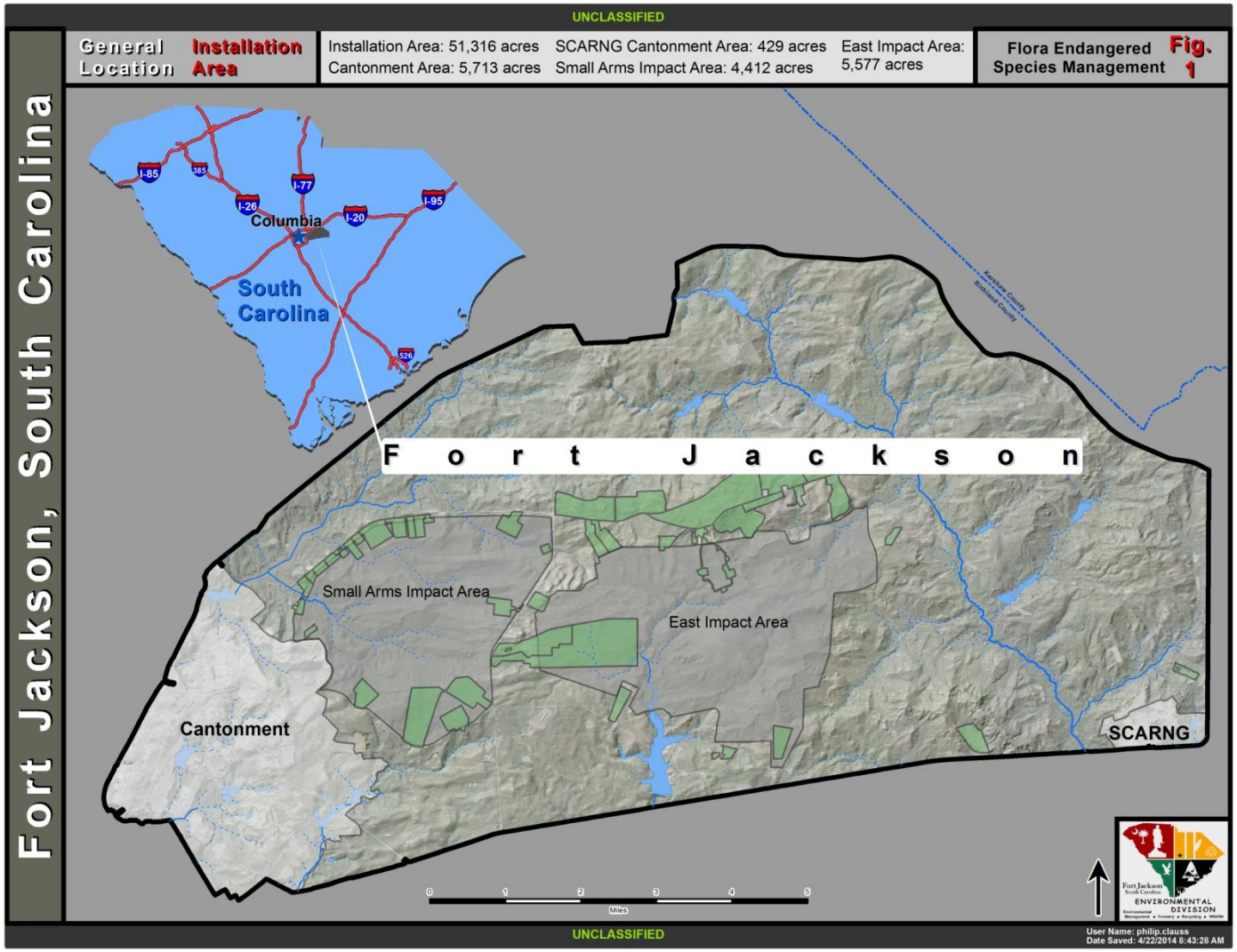

Figure 1. Location of Fort Jackson, South Carolina.

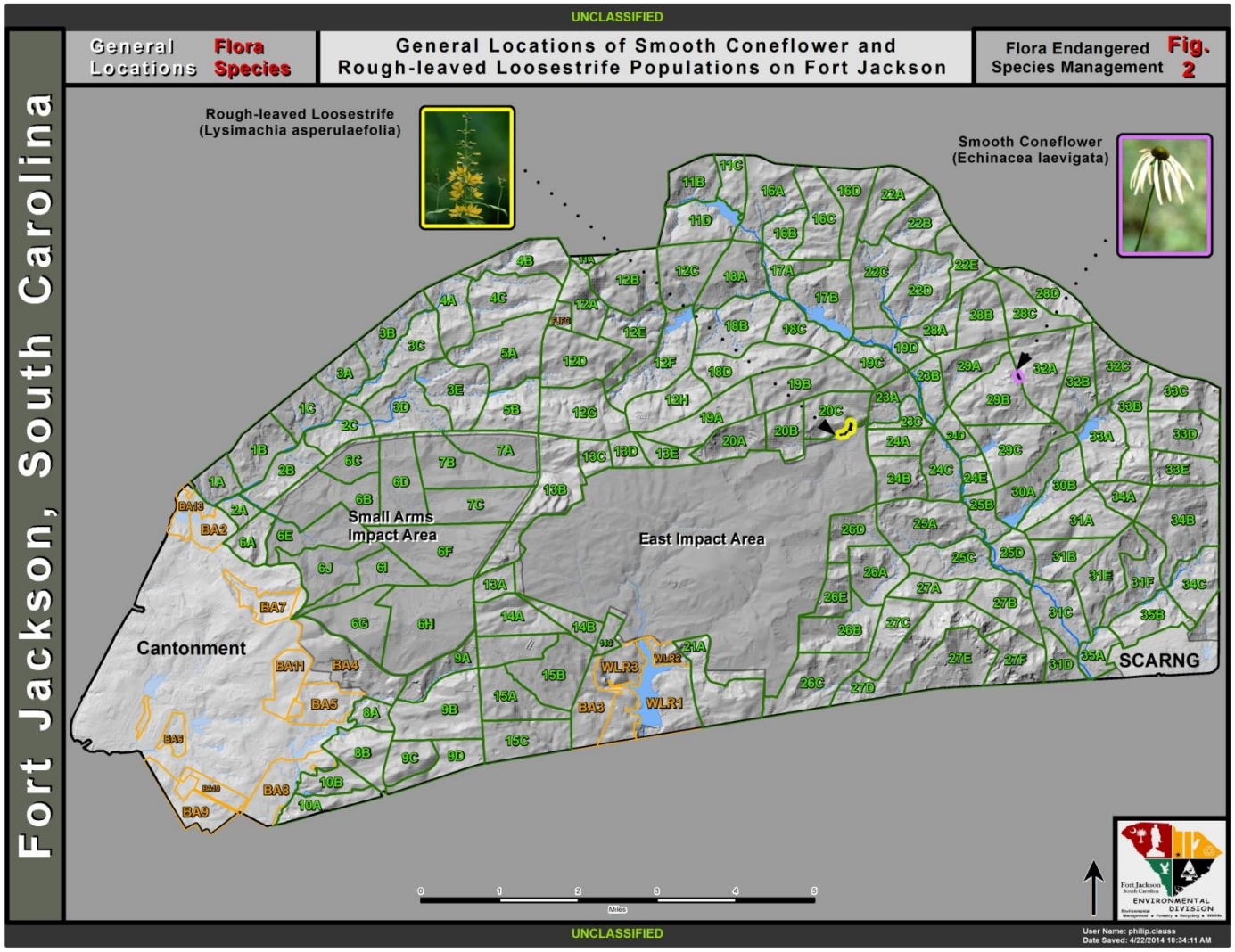

Figure 2. General locations of smooth coneflower and rough-leaved loosestrife populations on Fort Jackson, South Carolina.

2.0 SMOOTH CONEFLOWER (*Echinacea laevigata*)

2.1 Species Information

The smooth coneflower (*Echinacea laevigata*) is endemic to the eastern United States, ranging from Pennsylvania (historically) south into west-central Georgia (Gaddy 1990). It is one of nine species of Echinacea native to North America, and is a member of the Asteraceae, the aster family. Extant populations are known only from Virginia, North Carolina, South Carolina and Georgia. Seven populations (including the one at Fort Jackson) are known for South Carolina.

Echinacea laevigata is a rhizomatous perennial herb that grows up to 3.3 feet tall from a vertical root stock. A basal rosette of lanceolate leaves grows from a fleshy rhizome and fibrous roots. Leaves are typically 4 to 6 inches long and 1 to 3 inches wide, with 3 to 5 prominent veins. However, the large elliptical to broadly lanceolate basal leaves may reach up to 8 inches in length and 3 inches in width. The petioles are winged and purple tinged. The leaf surface is smooth to somewhat rough above and smooth beneath. Flower heads are usually solitary. Flowering occurs from May to mid July and fruits develop from late June to September. Ray flowers are light pink or purplish in color, usually drooping, and 2-3.2 inches long. The seed heads are hemispheric to conical with spiny protruding bracts.

The rosettes of this plant could be confused with *Silphium compositifolium*. However, the basal leaves of the latter species are nearly always larger, and are partially to prominently pinnatifid. *Echinacea laevigata* is similar to the closely related *E. purpurea*, which is commonly a more pubescent and robust plant. Additionally, the ray corollas of *E. laevigata* are decidedly narrower than those of *E. purpurea*. Further, the latter species is most common in the central plains states, with a scattering of records in the Southeast, including North Carolina and Georgia. There are no known localities of *E. purpurea* within South Carolina (SC Vascular Plant Atlas 1994).

Natural populations of this species from essentially all parts of its range occur on calcareous soils, or relatively high-pH soils over gabbro or other mafic rocks. In nearly all portions of its range, *Echinacea laevigata* reproduces from seed only at sites featuring considerable areas of bare ground. Large, vigorous colonies occur in the mountains of South Carolina (Oconee County) in open areas of reasonably concentrated calcium and magnesium. Successful or expanding colonies are generally found at open sites which allow optimum exposure to sunshine. These sites generally have bare soil with a fairly high pH. Seed germination is apparently much decreased otherwise. In general, reproductive output (fruit set) within this species, population to population, is low. Individual plants normally flower irregularly and certainly not each year. However, once established, plants tend to be rather resilient. Transplant studies involving this plant indicate that it may be moved fairly successfully and transplanting as a conservation option can be used to increase numbers. Should transplanting be considered as a means of managing the Fort Jackson population, the USFWS will be consulted to obtain concurrence on the conservation methodology.

2.2 Status of Fort Jackson Population

2.2.1 Population Description

The single population of this species occurs near Statue of Liberty Road on the eastern end of the installation (Figure 3). The population occurs at the edge of a partially shaded woodland, along a gently sloping road bank. Plants have never been identified outside this narrowly defined area, either to its west in the woodland proper, or to its east, across the road.

2.2.2 Population Size

Direct stem counts of flowering plants within the smooth coneflower population on Fort Jackson are easily made. It must be noted that individual plants more than likely bloom only irregularly. Attempts to count non-flowering, leafy plant bases must be undertaken for accurate assessments of this population. This population exhibited eight individuals in June, 1994. Only one of these was in flower, and it was producing fruits. The single head observed contained ripe seed which were in the process of being shed. A later observation indicated that two additional plants were in flower. A subsequent observation revealed a total of three fruiting heads (all producing mature achenes) on 11 October 1994. The number of flowers present was monitored each year beginning in 1997 (Table 1). Beginning in 2003, monitoring was modified to include the number of rosettes, buds, and flowers. Additionally, loss of stems due to herbivory was noted. The number of observed flowers increased from 3 in 1994 to a high of 29 in 2003 and 2005. Since 2005, the number of flowers has varied but has shown a significant decline over time (Table 1, Figure 4). The number of rosettes has declined from a high of 117 in 2004 to only 30 in 2014 (Table 1, Figure 5).

2.2.3 Threats

Threats to the smooth coneflower population include browsing, trampling, and shading. Steel posts and barbed wire have been placed around the population site to minimize human foot traffic, but the possibility exists that damage could occur from people crossing the fence. Fencing has been put in place around the stems to prevent browsing by deer. This practice also keeps the stems from inadvertent trampling. When smooth coneflower was initially discovered, the population was in danger of being shaded out by a well-developed pine/hardwood canopy that existed on the site. With written concurrence from the USFWS, staff from Fort Jackson removed most of the over-story canopy in May and October 1996. Woody competition has since been controlled by hand removal of stems and prescribed fire. Another possible threat to this population arises from potential erosion of the road bank it occupies. A check dam was installed in 1999 to help minimize water flow in front of the road bank. This appears to be helping to preserve the road bank from eroding.

Finally, and probably most importantly from a long-term view, plants could be threatened by a lack of fire in the area. A program of periodic prescribed fire has been implemented, with the site being burned on a 2-3 year rotation from 1997 until the present. Elsewhere in its range, smooth coneflower is considered a resident of open woodlands, glades, and meadows, all of which are likely to receive repeated burning.

Year	# Rosettes	# Buds	# Flowers	Burned	Date Burned
1997			10	Yes	03/11/1997
1998			13	No	
1999			12	Yes	03/24/1999
2000			18	No	
2001			20	Yes	03/27/2001
2002			24	No	
2003	113	6	29	Yes	03/26/2003
2004	117	1	5	No	
2005	110	4	29	Yes	02/17/2005 04/11/2005
2006	49	0	0	No	
2007	62	2	11	Yes	02/05/2007 04/24/2007
2008	36	3	3	No	
2009	29	0	5	Yes	03/10/2009 04/17/2009
2010	22	7	6	No	
2011	41	4	4	No	
2012	36	0	9	Yes	01/04/2012
2013	28	0	1	No	
2014	30	0	5	No	

Table 1. Smooth coneflower population data.

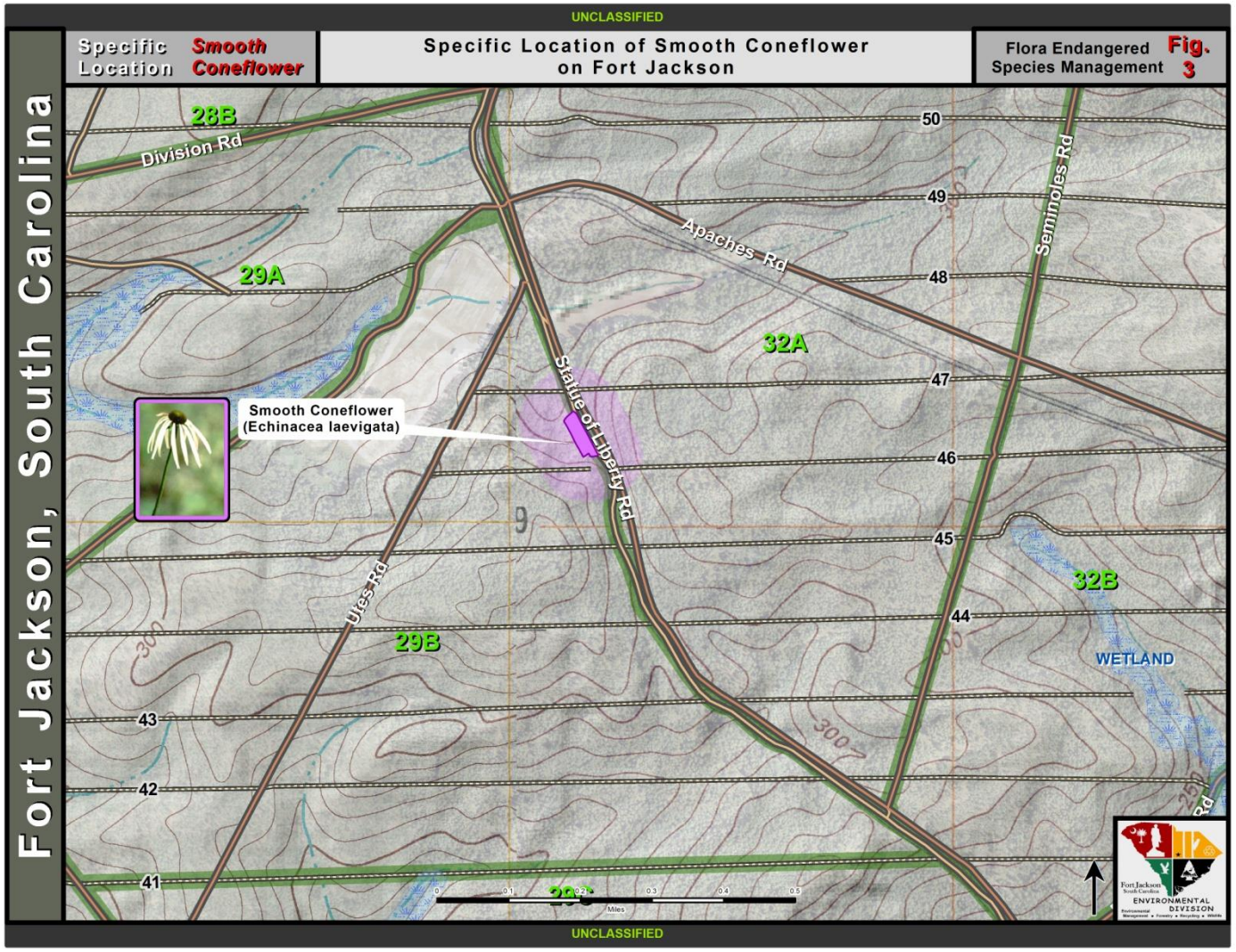

Figure 3. Specific location of smooth coneflower on Fort Jackson, South Carolina.

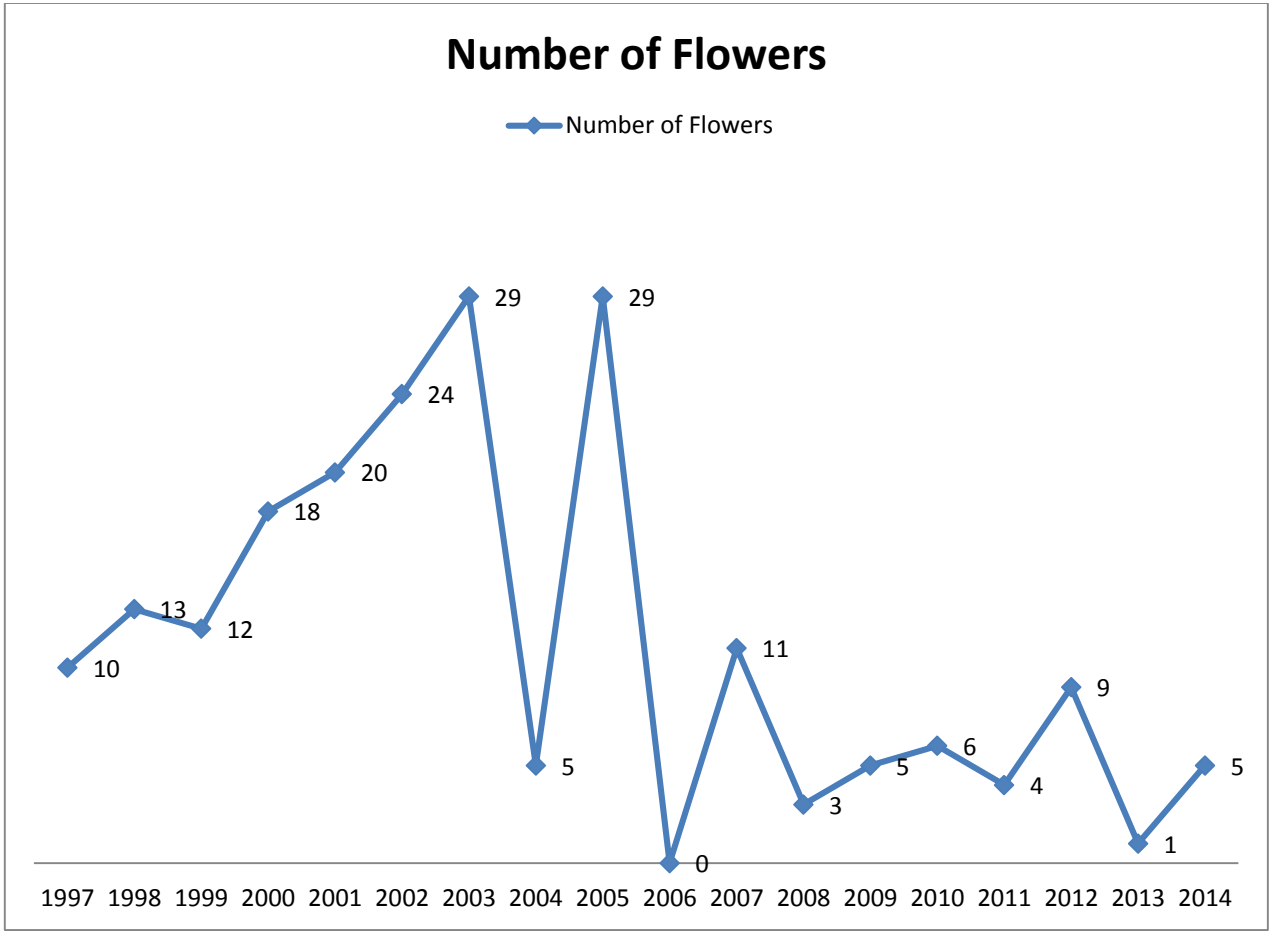

Figure 4. Total number of smooth coneflower flowers counted during monitoring.

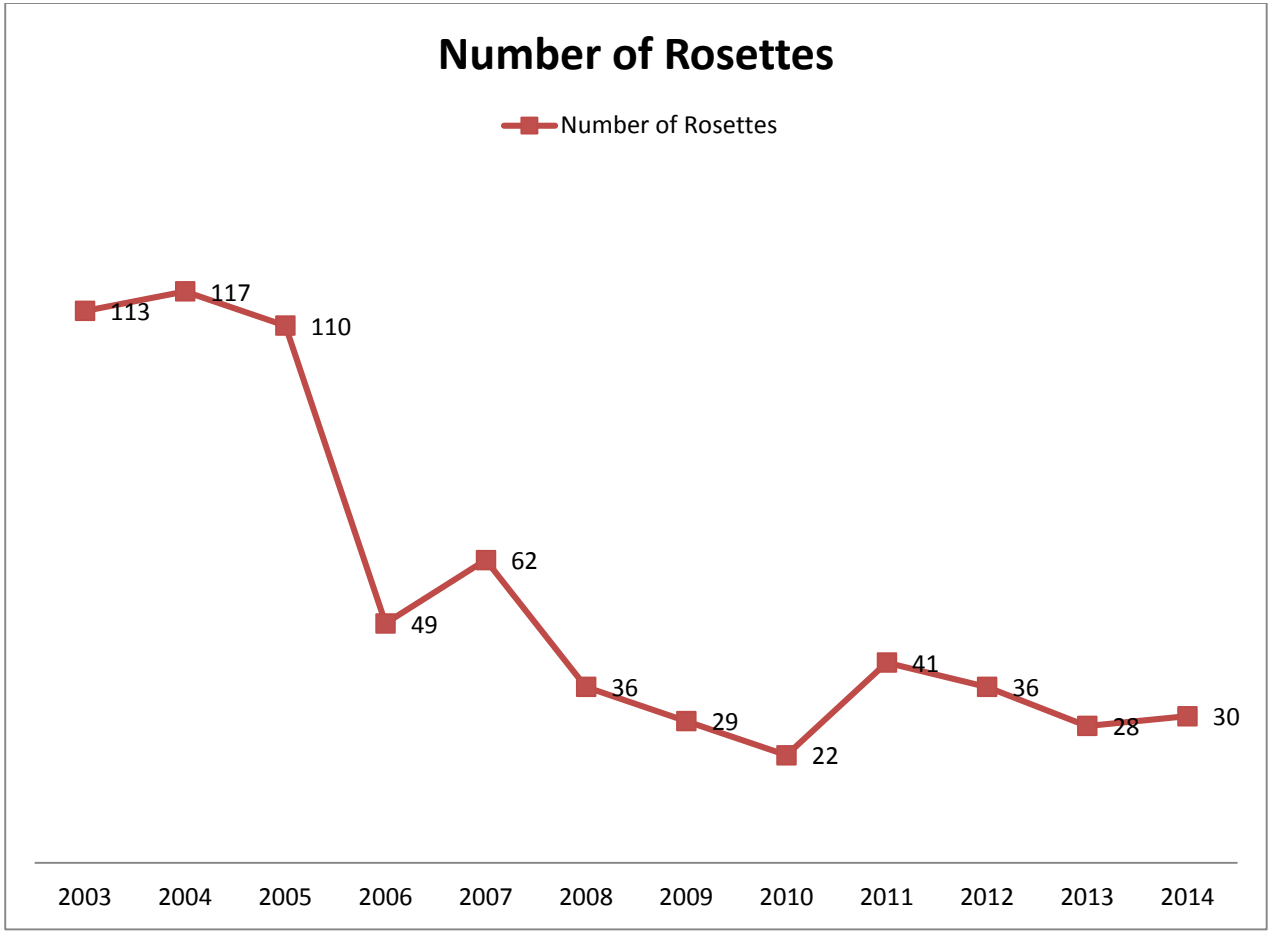

Figure 5. Total number of smooth coneflower rosettes counted during monitoring.

2.3 Conservation Goals

2.3.1 Fort Jackson's Contribution Toward Species Recovery

The USFWS recovery objective for smooth coneflower is reclassification from endangered to threatened to be followed by delisting. The USFWS will consider reclassification when 12 geographically distinct, self-sustaining populations are protected in at least two counties in Virginia, two counties in North Carolina, two counties in South Carolina, and one county in Georgia; when managers have been designated for each population; when management plans have been developed and implemented; and when populations have been maintained at stable or increasing levels for 5 years (USFWS 1995b). At least 9 of the 12 populations must be in natural habitats, in permanent conservation ownerships and management. Delisting will be considered when at least 15 geographically distinct, self-sustaining populations are protected as required in a specific number of counties and states; when populations have been stable or increasing for ten years; and when permanent conservation ownership and management of at least 10 populations are assured by legally binding instruments (USFWS 1995b).

Presently, the Fort Jackson population would not be considered a viable population for recovery of the species because of the small population size and the lack of suitable habitat on which the species naturally occurs. Therefore, implementation of conservation measures on Fort Jackson does not affect either reclassification or delisting of smooth coneflower. If conservation measures undertaken for smooth coneflower on Fort Jackson should cause a substantial increase in the size of the population, the possibility exists that the population might one day be considered relative to recovery criteria by the USFWS. Fort Jackson would look to the USFWS to provide a population size that it would consider self-sustaining.

2.3.2 Habitat

Current and Potential

Research has found that suitable habitat for smooth coneflower occurs on calcareous soils, which have characteristically high pH levels. Although Fort Jackson is located within the normal range of naturally occurring populations of smooth coneflower, the installation lacks those soil types typically associated with suitable habitat for the species. Since the site on which Fort Jackson's population of smooth coneflower occurs lacks the criteria normally associated with suitable habitat for the species, the origin of the single population of smooth coneflower on Fort Jackson is in question, and because of the small size of the population, it is inappropriate to assume that the species would be found on sites similar to that on which the known population occurs. Dr. Bert Pittman with the South Carolina Department of Natural Resources (SCDNR) concluded that there were no sites occurring on the installation that could be considered suitable habitat for smooth coneflower (Pittman 1996). Ms. Lori Duncan of the USFWS indicated that future surveys for this species are not required if suitable habitat does not exist in the project area. (Duncan 1999). In November 2002 USFWS (Abbott 2002) and SCDNR (Pittman 2002) agreed that surveys for smooth coneflower were not needed for projects.

In March 2003 the USFWS (DeGarmo 2003) and SCDNR (Pittman 2003) were consulted

again concerning surveying for this species and concluded that there is no determinable habitat on Fort Jackson.

2.3.3 Mission Requirements

Current and Future

The smooth coneflower population site is within a portion of Fort Jackson which is licensed to the South Carolina Army National Guard (SCARNG). The population at its current location will not impact any current or planned SCARNG training requirements. However, the population occurs approximately 200 yards from two artillery firing points utilized by SCARNG and is approximately 300 yards from an active Forward Operating Base. Because of the reproductive nature of smooth coneflower, it is unlikely that the population would expand from its current location into the areas being used by SCARNG. In the event that the population did expand into either of these adjacent training areas, then SCARNG and Fort Jackson will consult with the USFWS.

The smooth coneflower population on Fort Jackson is contained within a relatively small area (less than 1 acre). Therefore, training restrictions at this site will not significantly impact the overall training mission of the SCARNG or Fort Jackson. As a result, mission requirements should not interfere with the conservation of the species. The site is protected by limiting disturbances due to military training, and forest and wildlife management activities. The site is off limits to foot or vehicular traffic with the exception of management and monitoring activities.

Of special note, management for the Red-cockaded Woodpecker (RCW) should not impact the smooth coneflower population, as there are currently no known RCW groups adjacent to the population. The site will fall within the half-mile foraging partition for at least one future recruitment cluster and is subject to ecosystem restoration and management activities prescribed by the RCW ESMC. Fort Jackson will consult with the USFWS if any of these actions might impact the smooth coneflower population. Management activities such as prescribed fire would be beneficial to both the RCW and the smooth coneflower population.

2.3.4 Population

Current Population

The smooth coneflower population on Fort Jackson is measured by a census of the number of basal rosettes and flowers present on the site. From 1997 until 2002 monitoring consisted of a flower count only, but beginning in 2003, the numbers of basal rosettes and flower buds were collected as well. The population hit record numbers from 2003-2005 but has since declined to 5 flowers in 2014 (Table 1). Efforts to increase the population have included the harvesting of achenes and the creation of new seedbeds. Fort Jackson has a Section 10 permit that allows harvest of achenes from a portion of the flowers in the population (USFWS Permit # TE049494-0).

Summary of Population Goal Development

Since the only known occurrence of smooth coneflower on Fort Jackson is the current population site, the population goal for the species was developed by examining present and future mission requirements and land uses, which have the potential to impact this site. There are no current or planned mission related requirements that would impact the current population site. Fort Jackson will continue to protect the current population site from any type of military training or land management activity that might physically impact the site.

Population Goal

The population goal for Fort Jackson is to maintain a stable or expanding, self-sustaining population of smooth coneflower on its present site. The population was stable and expanding over the six-year period of 1997-2003 when flower numbers are compared. The population declined to 5 flowers in 2004 then rebounded to a high of 29 flowers in 2005. Since 2005, the number of flowers has steadily decreased to 5 in 2014 (Table 1, Figure 4). The number of basal rosettes had decreased from a high of 117 in 2003 to only 30 in 2014 (Table 1, Figure 5). Efforts to reverse this trend and meet the goal of a stable or expanding population are described in the Management Goals and Objectives.

2.4 Management Goals and Objectives

2.4.1 Goal One: Protect the smooth coneflower population

Objectives:

1. Maintain a policy of eliminating non-essential foot traffic, both military and civilian. Also, maintain exclusion of vehicular traffic from the edge of the population to avoid direct damage to the plants. This site has been established as a restricted access site. Construction activities will not be allowed to take place at this site, unless involving anti-erosion measures on the adjacent road and firebreak.

2. Maintain the existing fencing around the population.

3. Maintain the environmental awareness program on Fort Jackson. The protection of smooth coneflower on Fort Jackson depends on an understanding of the goals and requirements of the ESA by the military personnel training in the field. An environmental awareness-training program has been implemented so that installation personnel are made aware of the legal considerations, and need for protection of our small (less than 1 acre) population of smooth coneflower.

4. Maintain temporary wire exclusions around most plants to deter deer or other wildlife from eating flowering plants.

5. Continue to provide maps depicting the location of this population to Range Operations.

2.4.2 Goal Two: Preserve and enhance the population site

Objectives:

1. Continue the use of prescribed fire to ensure competing vegetation is controlled. From 1997 until 2004 the population was burned primarily in the late dormant season on a 2-year rotation. In 2005, 2007 and 2009, portions of the population were burned in February or March during the dormant season and the rest was burned in April during the growing season. Then in 2012, the population was burned during the dormant season (Table 1). Based on the current population trend, it is uncertain at this time how to best apply prescribed fire to the site to promote stability and even expansion of the population. The site is scheduled to be burned in 2015. Fort Jackson will monitor the results of prescribed fire on the population to determine the best strategy to meet population goals. The population appeared to be doing better when it was on a 2 year late winter burn rotation. Fort Jackson will return to this rotation but will evaluate the vegetative response to determine if changes need to be made during the period covered by this ESMC. Fort Jackson will continue to send information to the USFWS concerning the monitoring of the population and will recommend alternate burning regimes to the USFWS as warranted. Fort Jackson will consult informally with the USFWS every five years by way of this ESMC to recommend fire management strategies for this species. The population is scheduled to be burned in 2015, 2017, and 2019.

2. Control woody vegetation not controlled by prescribed fire with hand-tools to prevent excessive shading of the population.

3. Monitor old road bank and existing check dam to determine if additional steps must be taken to control erosion at the population.

2.4.3 Goal Three: Increase population

Objectives:

1. Create new seed beds adjacent to existing plants and sow achenes on them. The USFWS previously issued Fort Jackson permits allowing the installation to harvest up to 10% of the seed heads for this purpose. Initially this action was permitted under subpermit SA 98-28 which was issued under the USFWS permit number PRT 697819. This was later renewed as Section 10 permit number TE049494-0.

   Achenes were initially harvested in August of 1997 and sown directly into a seed bed (Seed Plot A) that had been cleared of woody vegetation and lightly raked. Twenty-seven individual smooth coneflower plants were observed in Seed Plot A in 1998, and 28 in 1999. Subsequent to this in 1999, seeds were scattered directly into two new seed beds (Seed Plots B and C) that had been prepared as Seed Plot A. Additionally, 72 achenes were planted in seeding trays and 10 achenes were individually planted in holes in Cage 1. Eight seedlings from the trays were later planted into Planted Plot A. These more

complicated methods of propagation were found to be less successful than scattering the seeds onto the prepared seed beds. Additional seed beds were established in 2000 (Seed Plot D), 2001 (Seed Plots E, F, G, and H), 2002 (Seed Plot I), 2003 (Seed Plot J), and 2005 (Seed Plot K). Harvested achenes were sown directly into each of the seed beds in the year the beds were prepared (Table 2). The last seed collection and planting was in 2005. Seeds have not been harvested since that time because of insufficient flowering. We were permitted to harvest 10% of the flower heads but there have been fewer than 10 flowers in all years except 2007.

Of the 12 seed plots created, Seed Plots A, B, F, and J continue to have smooth coneflower plants. The creation of new seedbeds and direct seeding of harvested seed did enhance the growth of the population. Therefore, Fort Jackson proposes to reinitiate propagation efforts by harvesting a minimum of 1 seed head per year up to 10% of the available seed heads in any year. Harvested achenes will be sewn into the existing Seed Plot A and one additional seed bed. Preparation of the seed bed will include removing any woody vegetation and raking lightly to expose mineral soil. Harvested seeds will then be spread over the exposed area and lightly covered with soil. Harvesting of achenes and creation of seed beds will take place in July-October.

Year	Seed Heads	Achenes Collected	Date	Comments
1997	?		8/1/1997	The number of seed heads collected was not noted.
1999		289	3/17/1999	1998 crop
1999	1	226	8/30/1999	
1999	6	182	9/23/1999	achenes were counted from one flower head
2000	11	200	9/27/2000	achenes were counted from one flower head
2000	7	245	9/28/2000	achenes were counted from one flower head
2001	17		10/10/2001	
2001	11		10/11/2001	
2002	2		10/23/2002	
2003	2		10/15/2003	
2005	2		10/25/2005	

Table 2. Smooth coneflower seed harvest on Fort Jackson

2.4.4 Goal Four: Maintain current information on status and trends of smooth coneflower on Fort Jackson.

Objectives:

1. Implement a monitoring plan for smooth coneflower evaluating population dynamics. Fort Jackson will conduct annual monitoring during the flowering period for smooth coneflower to determine demographic trends within the known population. In 2003, Fort

Jackson participated in a committee to develop monitoring protocols for smooth coneflower. It was recommended by the USFWS that Fort Jackson conduct monitoring based on the protocol developed by this committee. Fort Jackson implemented Level Two of this protocol beginning in 2003. Level Two monitoring is a total census of the population and includes counting total number of rosettes, buds, flowers and/or seed heads and the total number of cut stems due to herbivory (Appendix A).

2.4.5 Goal Five: Survey for the Species

Effective management of the smooth coneflower requires an accurate survey of installation land for potentially unknown populations of the species. The installation was surveyed for endangered plant species in 1992 (Nelson 1992) and 1995-1996 (Bishop 1997). The single population of smooth coneflower was discovered during the 1992 survey. No new populations were discovered during the 1995-1996 surveys. Informal consultations during 1999 and 2002 with the USFWS determined that no additional surveys for this species will be conducted (Duncan 1999, Abbott 2002). In March 2003, Phil DeGarmo of the USFWS, through informal consultation with Fort Jackson and Dr. Bert Pittman of the SCDNR, determined that there is no determinable habitat for this species on the installation (Pittman 2003, DeGarmo 2003). An additional survey for threatened and endangered plants was conducted on the portion of the property licensed to SCARNG in 2010, and no new populations of smooth coneflower were documented (Gaddy 2010).

3.0 Rough-leaved loosestrife (*Lysimachia asperulaefolia*)

3.1 Species Information

Rough-leaved loosestrife is an erect, rhizomatous, perennial herb that may grow to a height of over 2 feet. It was listed as federally endangered on 12 June 1987 (USFWS 1987). It is endemic to the coastal plain of North and South Carolina, with 55 occurrences in North Carolina and a single occurrence in South Carolina on Fort Jackson.

Flowers of rough leaved loosestrife are produced in May and June. Pollination usually occurs through bees, and at least 7 bee species have been observed visiting flowers in North Carolina populations. However, due to low production of viable seed and the lack of a specialized mechanism for seed dispersal, establishment of new populations by sexual reproduction is thought to be rare (Frantz 1984). Asexual reproduction through rhizomatous growth appears to be more important to population dynamics than sexual reproduction. Several stems may arise from a single rhizome (USFWS 1995a).

This species is known from wetland sites throughout its range. It tends to occur on acidic soils, either in moist or seasonally saturated sands or on shallow, organic soils overlying sand (Russo et al. 1993). In North Carolina it grows in wooded ecotones at pocosin edges, especially on deep peat or peat/sand substrates typical of low pocosins and Carolina bays. Though rough-leaved loosestrife most often occurs along the ecotone between longleaf pine uplands and pond

pine pocosins, it has also been found in longleaf pine flatwoods, Sandhill seeps, lake margins, and utility corridors (USFWS 1995a). Although there are old records of its occurrence within South Carolina, the discovery of *Lysimachia asperulaefolia* on Fort Jackson is the only recent record of the species within the state. No verifiable descriptions of its habitat in this state have been available.

3.2 Status of Fort Jackson Population

3.2.1 Population Description

The Fort Jackson population (Figure 6) represents the single, extant South Carolina occurrence of rough-leaved loosestrife. The population was originally identified on the sandy seepage of a hillside drained by a narrow, clear-water stream (Buffalo Creek) within Buffalo Creek Bog Natural Area in 1992 by Dr. John Nelson (Nelson 1992). The majority of the population is dominated by a variety of herbaceous plants, and thus may not be considered "pocosin". The drainage on which much of the population occurs is on the mid-level elevation of a hillside. This area is easily characterized as ecotonal between a truly hydric (wetland) environment and a much drier sandhill. The portion of the population that was first discovered roughly follows a contour of about 230-240' in a gentle arc on the east-facing slope of a north-south cul-de-sac of Buffalo Creek, entirely within the EIA, and has the potential to receive explosive ordnance.

3.2.2 Population Size

Additional units of rough-leaved loosestrife have been found since the area was first surveyed. Although these various units are all within the Buffalo Creek area in close proximity to each other, they appear to be distinct groups. Because of these new discoveries, the population was mapped in May 1996 as six separate units. One of the newly discovered units is even larger than the original portion that was discovered. This unit is southwest of the original portion of the population and is approximately 1.64 acres in size. The combined area of all six units is approximately four acres. Scattered patches within each of the mapped units are found on flat land some distance from the sandhill slope and occur on hydric soils.

Soils within this drainage are dominated by Johnston loam (USDA 1978), which are typically found along coastal plain streams. These are deep, very poorly drained soils that are saturated most of the year. Uphill from these wet soils are Vaucluse loamy sands, which are very well drained, sandy soils overlying fragipans. Various points along this slope are nearly constantly damp as indicated by existing vegetation. These points represent sites at which downwardly draining water is forced laterally and to the surface of the slope by the hard fragipan.

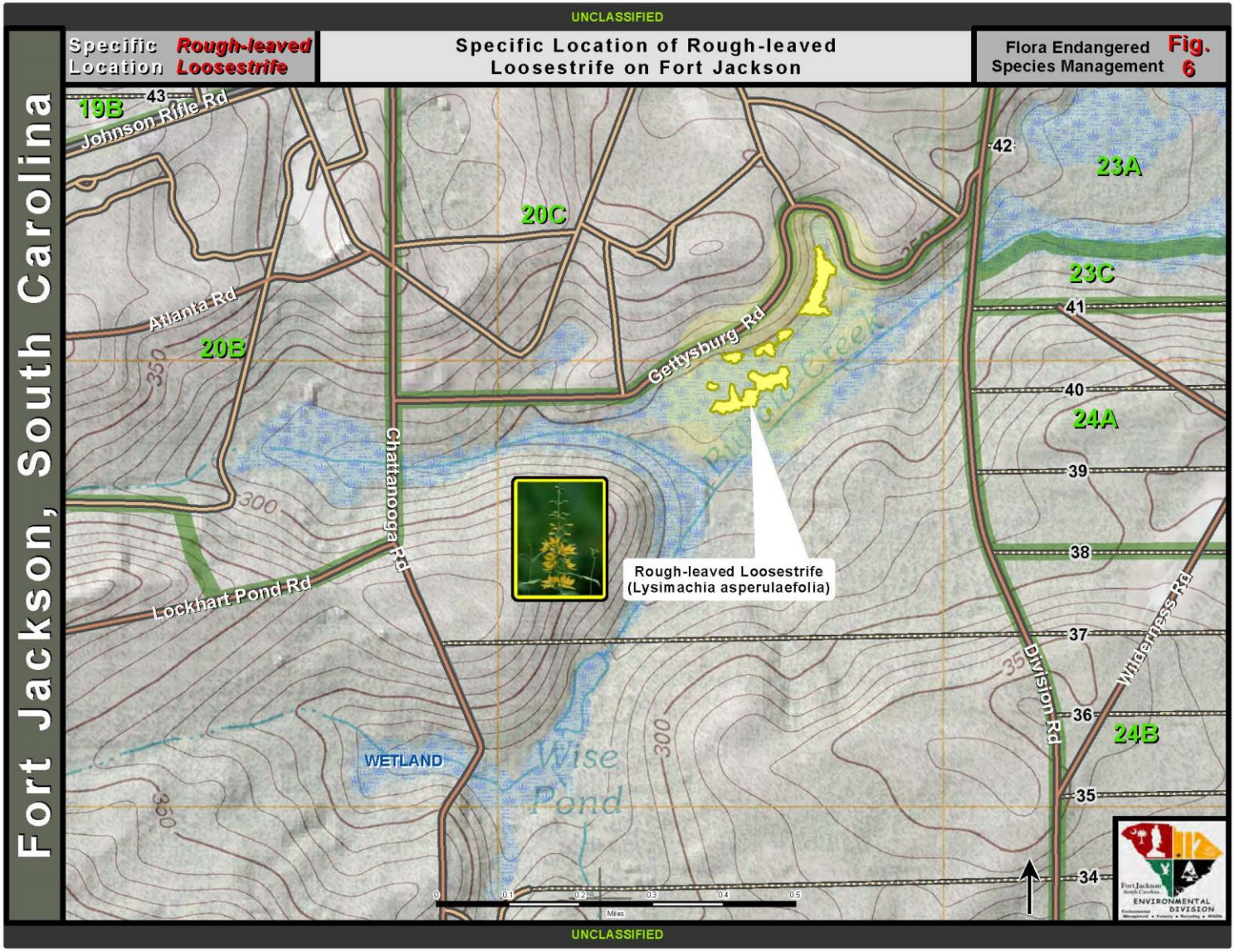

Figure 6. Specific location of rough-leaved loosestrife on Fort Jackson, South Carolina.

3.2.3 Threats

Since rough-leaved loosestrife is a shade-intolerant, fire dependent species, the buildup of woody vegetation within the area due to fire exclusion would likely have deleterious effects on its overall vigor. Exclusion of a frequent fire regime would jeopardize rough-leaved loosestrife and all other fire dependent species in the Buffalo Creek Natural Area. Plants of this species may persist for many years in overgrown, fire suppressed areas, but they will be unlikely to reproduce sexually, and will likely have declining vigor.

The threat of fire exclusion has been eliminated as the area has been systematically burned many times since the population was discovered. There is some concern that the current fire regime is not producing the desired result of population maintenance and expansion. However, it is uncertain how much drought and changes in soil moisture over the years have impacted the population. Fort Jackson is currently evaluating frequency and seasonality of fire to determine best conservation practices for this species.

Troops do not travel in the EIA, therefore trampling due to training is not an issue. Some trampling may occur during monitoring of the population, but efforts are made to minimize this impact. The population's threat by ordnance is minimal because it is outside the main target box of the EIA. A potential threat to the northern portion of the population exists in the form of siltation. Erosion control efforts implemented several years ago have been effective at minimizing this threat.

As stated above, the population of rough-leaved loosestrife is located in the EIA, and potentially has the presence of unexploded ordnance (UXO). Beginning in 2004, Fort Jackson natural resources staff lost permission to enter portions of the population due to the risk associated with UXO. The 748th Ordnance Company (Explosive Ordnance Disposal) indicated in a letter dated 28 March 2005 that it will not support entry into the wet areas of the population. Because of the potential risk to personnel, only 37% of the existing permanent plots will continue to be monitored. However, the entire population will continue to be prescribed burned using aerial ignition when possible, and by lighting from existing firebreaks and roads when aerial ignition is not available. Fort Jackson will continue to consult with the USFWS regarding monitoring and management, including the use of prescribed fire.

3.3 Conservation Goals

3.3.1 Fort Jackson's Contribution Toward Species Recovery

The USFWS Recovery Plan for rough-leaved loosestrife identifies delisting this species as the recovery goal (USFWS 1995a). Reclassification from endangered to threatened is recommended as a possible interim step. Rough-leaved loosestrife will be considered for reclassification from endangered to threatened when: 1) management plans have been written and implemented for all populations which occur on publicly owned lands and those owned by the Nature Conservancy; 2) all population centers have been monitored for at least five years and are determined to be stable. The species will be considered for delisting when the above conditions are met and when a binding management agreement is in place for each population

center. Fort Jackson is among the list of population centers identified in the USFWS recovery plan that are required to meet the previous criteria in order to obtain reclassification and delisting for the species.

Fort Jackson will be able to continue prescribed burning this species, protect it from disturbance from military training, other than ordnance, but will be unable to provide comprehensive monitoring data. See Threats in 3.2.3 above. Because of this Fort Jackson cannot meet the criteria above associated with helping the USFWS determine whether the population is stable.

3.3.2 Habitat

Current and Potential

Fort Jackson has approximately 5,500 acres of wetlands, some of which could be considered suitable habitat for rough-leaved loosestrife. However, the large majority of wetlands on the installation are typically bottomland hardwood wetlands, characterized by closed canopies. Since rough-leaved loosestrife is a shade intolerant species, it is not likely to occur in these wetlands. Suitable habitat potentially exists at the wetland-nonwetland interface of these forested wetlands, as well as openings within these areas. In addition, those limited wetland areas that have been burned in the past have a greater potential for rough-leaved loosestrife to occur. If fire is applied to wetlands in the growing season, and the habitat becomes predominantly herbaceous, these areas will be surveyed for rough-leaved loosestrife. Installation-wide threatened and endangered plant surveys of these areas for rough-leaved loosestrife in 1995 and 1996 revealed no additional populations of this species (Bishop 1997). Additionally, an inventory for threatened and endangered plant species was conducted across the training areas licensed to the SCARNG in 2010 (Gaddy 2010). No additional populations of rough-leaved loosestrife were located during these surveys.

3.3.3 Mission Requirements

Current and Future

Because of the various wetland regulations in place as a result of the Clean Water Act, there are no current or proposed training mission requirements that would significantly impact wetlands, and therefore, suitable habitat for rough-leaved loosestrife. Mission related activities must also avoid filling wetlands.

Forestry management activities, which may impact wetlands, must follow guidance from the U.S. Environmental Protection Agency in a letter to Fort Jackson dated November 5, 1993. This letter indicates that silvicultural activities in forested wetlands must be part of an "ongoing silvicultural operation that will not result in a change in use or a reduction in reach or impairment of the flow or circulation of waters of the United States…Road construction in forested wetlands must be built according to Best Management Practices" (USEPA 1993). The installation has been surveyed for this species and only one population center has been found. There will be no forest product harvesting in the vicinity of the known population. Forest management activities

such as prescribed burning in wetlands during the growing season may actually improve habitat for the species by reducing the amount of competing vegetation and overhead canopy.

Should a significant threat to our national security occur, Fort Jackson may have to mobilize to train additional soldiers. In the event that mobilization is required, Fort Jackson will consult with the USFWS regarding potential adverse impacts to the rough-leaved loosestrife.

3.3.4 Population

Current Population

Stems of Rough-leaved loosestrife arise from subterranean rhizomes. It has been estimated that up to 50 aerial stems may be generated along the length of a single, healthy rhizome in some populations in North Carolina (North Carolina Heritage Program 1993). It is difficult to distinguish independent seedlings from small aerial stems attached to old rhizomes. Thus, comprehensive stem counts within intact populations are useful in suggesting vigor of populations, but estimates of number of individual plants cannot be made with accuracy. Direct stem counts of the known population were made at two different times in 1994 (June and July). Due to the extensive nature of the population as mapped, and difficulties encountered in locating matted or overgrown plants, the figure of 5,400 stems (flowering and non-flowering) was considered a conservative approximate estimate at that time. More useful estimates of population vigor based on stem number are derived from within-quadrat stem counts. Because of the small size of each plot, precise counts can be made and data can be compared from one year to the next to analyze trends in stem and flowering numbers.

While monitoring the population in April 1996, additional units of rough-leaved loosestrife were discovered within the Buffalo Creek area. Due to the extent of the area these additional units comprised, it was impractical, if not impossible, to count the total number of stems within the population. The total number of stems was conservatively estimated to be 90,000 stems (Cole 1996). Eight permanent plots were established in 1992. Nineteen additional plots were established after the discovery of more units of rough-leaved loosestrife in 1996, for a total of 27 plots.

The entire population of rough-leaved loosestrife on Fort Jackson is within an area suspected of containing UXO. Prior to 2004, personnel had been given access to the area for monitoring as long as safety protocols were followed. However, access was not permitted in 2004 pending the results of a safety risk assessment. Based on the findings of this risk assessment, it was recommended that monitoring be limited to the dry areas above Buffalo Creek, and to avoid the wet areas immediately surrounding the creek bed. Following these guidelines, only 10 of the established plots were deemed safe for monitoring. The rest of the plots have not been monitored since 2003. Permanent plot numbers, total stems, and flowering stem counts for the 10 plots currently monitored are found in Table 3.

Since 1997, 10 plots have been monitored annually with the exception of 2004. There has been a marked decline in the number of stems and flowers from 1997 to 2014 (Table 3, Figure 7). Five of the 10 plots have been continuously monitored since 1992 (Table 3). Trend data for these plots show that the population appeared to be stable between 1992 and 1995, and then

increased dramatically in 1996. In 1997, the population was again at a near record high and then started to plummet. In 2014 only 32 individuals were counted and no flowering stems were counted (Table 3, Figure 8). No flowering stems have been observed since 2007. While the cause for this dramatic decline is not completely understood, it is likely a combination of inadequate control of competing vegetation and the lingering effects of a long term drought.

The site was burned annually in the late winter or early spring from 1983 until 1991. It was burned every two years between 1993 and 1997, with 1995 being an intense wildfire during April. A 3-year burn rotation was established in 1997. Because there has been a decline in total number of rough-leaved loosestrife stems in sample plots since 1997, it is believed that this fire interval may be insufficient to control hardwood competition. Fort Jackson consulted with the USFWS and prescribed burned the population in 2003, 2004 and 2005 in order to eliminate or greatly reduce woody species competition. Despite these efforts the population continues to decline. The site has been burned on a 2 to 4 year rotation since 2005 (Table 4). During sampling this year it was noted that the shrubby vegetation had gotten to a height greatly exceeding that during the period in which the population was the most vigorous. This seems to confirm that the current fire regime is not adequate to control the competing vegetation. However, a high intensity prescribed fire was conducted in the spring of 2014 and may have greatly reduced the competing vegetation. The population response and recovery of competing vegetation will be closely monitored in 2015 in an effort to understand how to best apply fire to the site in order to promote population stability and expansion.

Complicating the response to fire is the fact that the region has experienced several long term droughts since 1997. A long term drought plagued the area from 1998 until 2003. From 2003 until May of 2007 conditions were somewhat normal, but there were periods of incipient drought in the summer of 2004. Severe drought conditions developed again in May of 2007 and persisted through March of 2009. Again in 2010, drought conditions developed and persisted through March of 2013. It is likely that the extended periods of drought have negatively affected the population.

A third issue related to the decline is that the plots that have been continuously monitored are the furthest upslope from the wetlands, and may be more likely to be influenced by drought conditions. When data were collected on all 27 plots between 1997 and 2003, the plots that were nearer to the wetland typically had a larger number of stems (Figure 9). Based on the data between 1997 and 2003, the plots within the wetter sites had on average more than double the numbers counted in the continuously monitored plots. However, even these plots show a drastic decline between 1997 and 2003 from a high of 2, 611 stems and an average of 154 stems per plot, down to 1,360 stems and an average of 80 stems per plot. Continuously monitored plots decreased by 49% over this time period and the plots no longer monitored decreased by 48%, indicating that the overall population was experiencing a similar decline. Due to the fact that a majority of the plots are no longer monitored, it is difficult to make an accurate assessment of the health of the rough-leaved loosestrife population on Fort Jackson.

Year		92	93	94	95	96	97	98	99	00	01	02	03	05	06	07	08	09	10	11	12	13	14
Total Stems	**Plot #**																						
	1	70	40	60	66	179	161	100	78	80	68	48	45	17	18	8	12	13	10	12	10	8	6
	2	55	25	47	39	126	125	62	39	46	39	30	13	10	15	8	7	4	3	6	5	6	1
	3	21	27	21	24	69	55	50	44	46	48	41	33	23	27	28	22	16	20	27	29	16	7
	4	52	49	56	40	97	114	90	68	46	51	37	40	46	23	35	34	34	15	21	22	18	6
	5	11	13	18	20	41	50	46	50	55	53	34	41	35	25	16	13	9	3	0	1	0	0
	8				12	12	10	17	16	9	11	3	1	1	5	1	3	1	1	0	0	0	0
	24						19	58	51	50	37	18	12	4	0	0	11	0	0	0	0	0	0
	25						53	63	66	79	91	56	82	34	16	10	23	24	28	19	14	8	3
	26						27	35	55	42	54	30	49	43	51	20	26	24	21	12	15	11	5
	27						20	12	15	16	14	11	9	17	15	6	0	5	5	9	6	7	4
Total							**634**	**533**	**482**	**469**	**466**	**308**	**325**	**230**	**195**	**132**	**151**	**130**	**106**	**106**	**102**	**74**	**32**
Flowering Stems																							
	1	12	36	0	12	3	9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	4	20	1	7	0	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	3	6	13	2	6	4	2	4	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	4	8	12	0	1	0	3	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
	5	1	12	0	8	3	14	3	1	2	1	0	2	3	0	0	0	0	0	0	0	0	0
	8				3	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	24						0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	25						1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	26						3	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	27						9	1	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0
Total							**45**	**14**	**3**	**2**	**1**	**0**	**4**	**7**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Table 3. Rough-leaved loosestrife population trend on Fort Jackson. Total number of stems per plot and total flowering stems are reported.

Year Burned	Date	Comments
1983	03/14/1983	
1984	02/22/1984	
1985	02/18/1985	
1986	03/05/1986	
1987	02/10/1987	
1988	02/10/1988	
1989	03/19/1989	
1990	02/13/1990	
1991	03/20/1991	
1993	02/18/1993	
1995	04/08/1995	Intense wildfire
1997	03/22/1997	
2000	12/20/2000	
2003	03/23/2003	
2004	03/21/2004	Outer edges burned
2004	04/17/2004	Inner edges burned by helicopter
2005	03/20/2005	
2007	01/20/2007	
2010	04/03/2010	
2014	04/25/2014	

Table 4. Fire history for the rough-leaved loosestrife population on Fort Jackson.

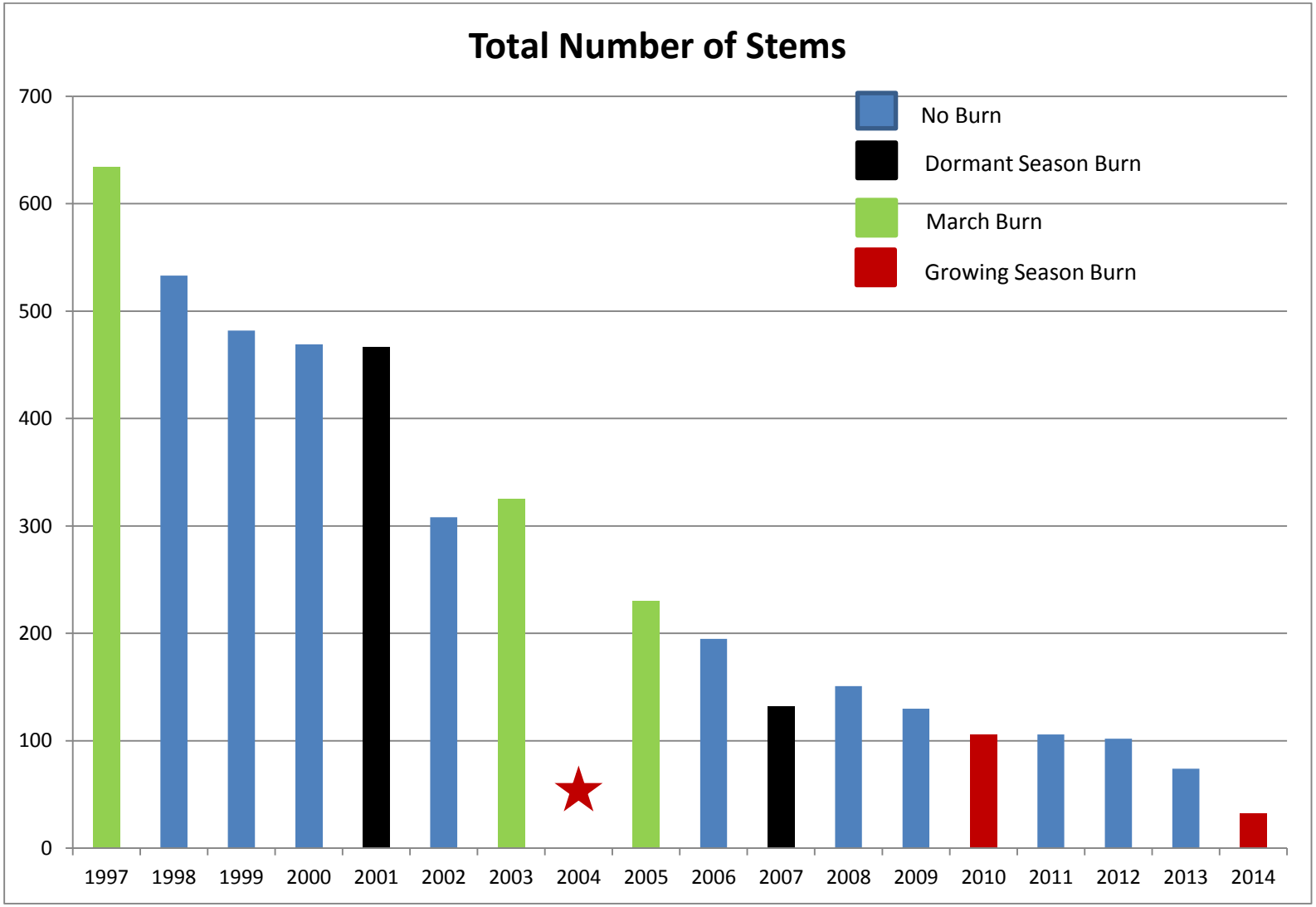

Figure 7. Total number of rough-leaved loosestrife stems counted annually in 10 continuously monitored plots on Fort Jackson. Monitoring was not permitted in 2004 but the site was prescribed burned during the growing season.

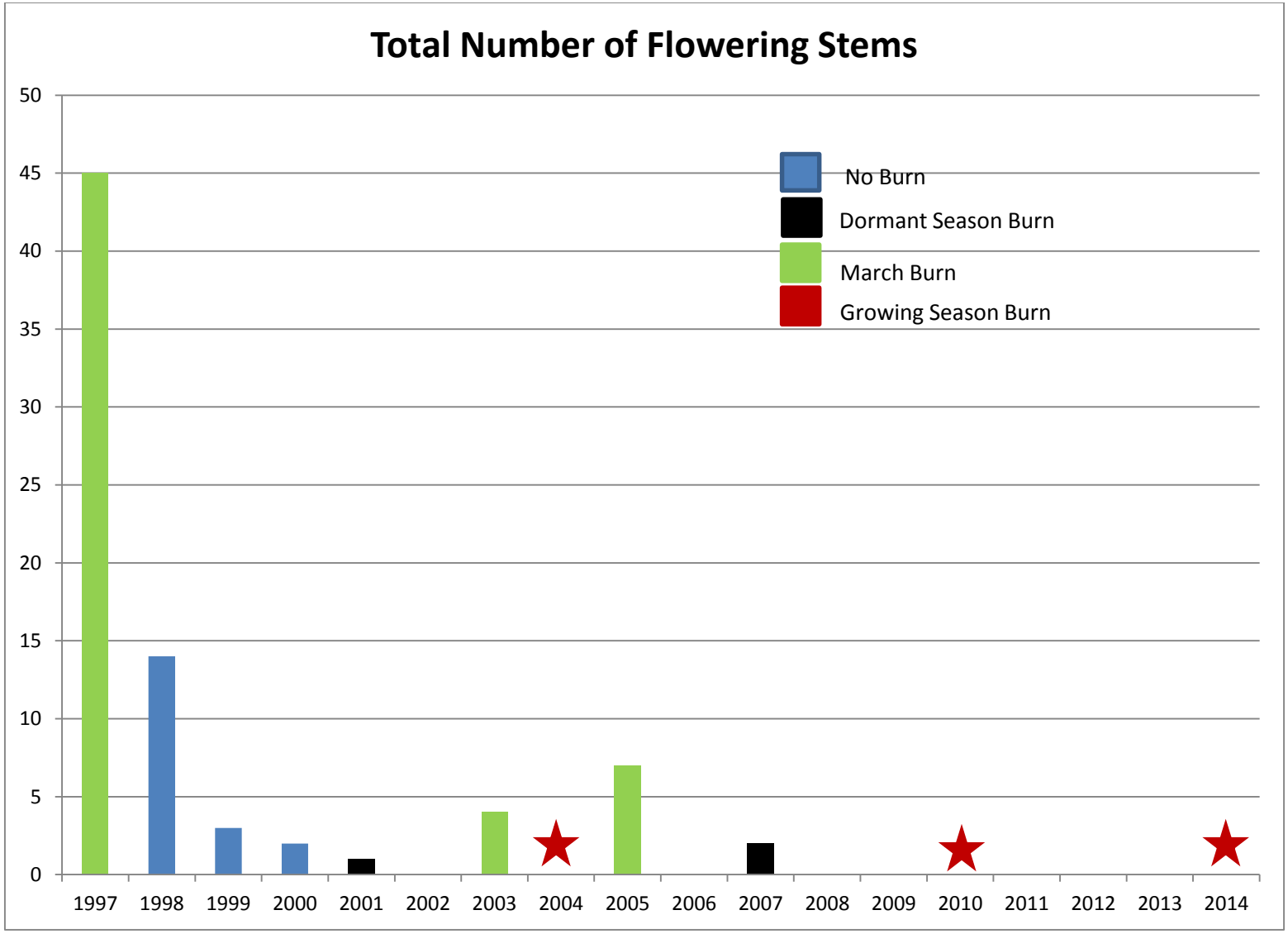

Figure 8. Total number of rough-leaved loosestrife flowering stems counted annually in 10 continuously monitored plots on Fort Jackson. Monitoring was not permitted in 2004 but the site was prescribed burned during the growing season. No flowers have been observed since 2007 but the site was burned during the growing seasons of 2010 and 2014.

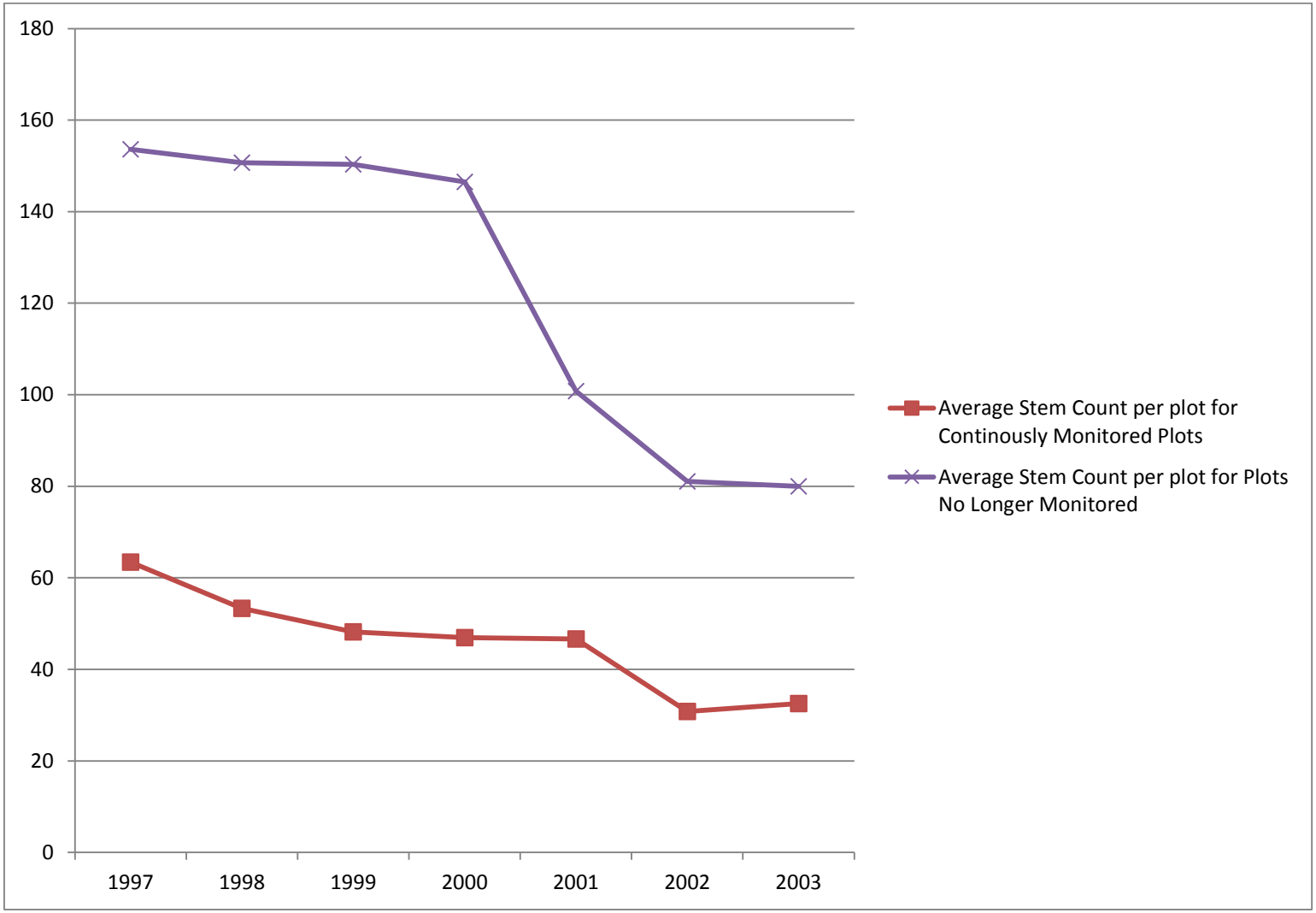

Figure 9. Average number of stems on continuously monitored plots on Fort Jackson as compared to average stem count for the plots that are no longer monitored.

Summary of Population Goal Development

Comparing current habitat with present and future mission requirements and land use helped in developing the population goal for rough-leaved loosestrife on Fort Jackson. Since the species is typically found in wetland habitat, and currently only in the impact area, impacts from training and other mission requirements to current habitat will be minimal. Presently, there are no current or planned mission requirements, which would adversely impact the population site or other suitable habitat.

Population Goal

The Fort Jackson population goal for rough-leaved loosestrife is to maintain a stable or expanding population for at least five consecutive years. The USFWS recovery plan for rough-leaved loosestrife (USFWS 1995a) mandates that populations must be stable over a five year period within each of the population centers before the species will be reclassified from endangered to threatened. Since it is impractical to obtain a total stem count of the entire population, data had been collected from 27 sample plots and analyzed to ascertain the overall trends and health of the population. The 27 plots were randomly distributed among the six units of the population. Data from the 27 permanent plots from 1997-2003 suggested that the Fort Jackson population was in decline (Table 2). Since 2003, only 10 of the 27 sample plots have been monitored because access to the other plots was restricted. A severe decline has been noted on these 10 plots since 1997, with a 95% reduction in the number of stems between 1997 and 2014. A population viability analysis performed in 2004 using data for the fixed plots indicated that the mean time to extinction for the population was 111 years, with confidence interval bounds of (0, 230) (Grego 2005). In this same analysis, the mean time to reach the 5% threshold was 34 years, with lower and upper limits at 0 and 70.1 years, respectively. In 2014, the population appears to have reached that 5% threshold, much faster than predicted by the population viability analysis. However, the entire population is not being sampled and the magnitude of the decline may not be as great as what is indicated by the 10 sample plots. It does appear, based on the data collected, that the population is in decline and thus not meeting the population goal of a stable to expanding population for at least 5 years. The USFWS is provided with an annual report on the demographics of this population. Efforts to stabilize the population are discussed below.

3.4 Management Goals and Objectives

3.4.1 Goal 1: Implement protective management for the rough-leaved loosestrife population

Objectives:

1. Maintain a policy of eliminating non-essential foot traffic in the area. Because of its location in the EIA, there are no potential impacts from other activities including military field training operations, construction projects, and vehicle maneuvers.

2. The boundary of the rough-leaved loosestrife population will not be marked with signs. Since the entire population is within the boundary of the EIA, a restricted area, all access to the site must be authorized through Range Operations.

3. Maintain the environmental awareness program on Fort Jackson. The protection of rough-leaved loosestrife on Fort Jackson depends on an understanding of the goals and

requirements of this program by military personnel training in the field. The environmental compliance officer course has been implemented so that installation personnel are made aware of the ESA and what is being done to manage and protect this species on Fort Jackson.

3.4.2 Goal 2: Implement and maintain site management techniques necessary to preserve and enhance the natural ecosystem in which the population occurs

Objectives:

1. Continue to implement a prescribed fire regime to manage for the species. Fire is the most critical component for managing natural systems in the southeast. Rough-leaved loosestrife and all other native herbaceous plants associated with this type of wetland system are fire dependent. These species are unable to compete with woody vegetation that rapidly encroaches when fire is excluded.

   The site was historically burned annually from 1983-1991. The population has been prescribed burned regularly since that time, as described in the Population Status section above and Table 3. However, the most recent prescribed fire regime appears to be ineffective at controlling competing vegetation. Anecdotal evidence from personnel involved in monitoring the population since the mid 1990's suggests that the competing vegetation has become denser and higher. Based on this observation and the fact that the population is doing so poorly, we suggest returning the site to a fire regime more similar to that when the population was first discovered. To this end, we are proposing to return the site to a 1-2 year burn rotation, preferably executed in the late winter or early spring. Conditions will be monitored before and after burns, and throughout the year to include flowering season and late winter, to determine how the vegetation is responding to fire, and whether the site should be scheduled to burn. Adjustments to the burning regime will be made based on the rough-leaved loosestrife population response.

2. Monitor the effectiveness of anti-erosion construction on the road to the north of this population to ensure that there are no additional impacts to the population site from uncontrolled erosion.

3.4.3 Goal 3: Maintain current information on status and trends of the population

Objectives:

1. Maintain 10 existing sample plots within the population for annual (growing season) stem counts. Annually count total stems and flowering stems within each permanent plot.

2. Perform a population viability analysis for the Fort Jackson rough-leaved loosestrife population. It was suggested in the Population Viability Analysis Final Report (Grego 2005) that a viability analysis be performed after collecting 2009 monitoring data to see if we can determine the viability of this population. This analysis was not performed due to the fact that we can no longer collect data for all of the plots analyzed in 2005. Fort Jackson is currently evaluating the feasibility of having another population viability analysis performed using the data from the 10 plots that are currently monitored.

4.0 SPECIAL CONSIDERATIONS

4.1 Cooperation with the USFWS

Fort Jackson will work closely and cooperatively with the USFWS on conservation of these plant species. Consultation will be initiated prior to any significant changes to this plan.

4.2 East Impact Area Access

The population of rough-leaved loosestrife is located in the EIA. Fort Jackson has been informed that it will no longer be allowed to enter the wet portions of this population to monitor the species. The 748th Ordnance Company (Explosive Ordnance Disposal) has indicated by letter dated 28 March 2005 that it will not support entry into the wet areas of the population. In addition, two upland plots will not be monitored because of the long distances that must be traveled by foot in the EIA to reach them. Because of risk to personnel only 37% of the existing permanent plots will continue to be monitored. The population will continue to be prescribed burned.

4.3 Previous and Future Surveys

4.3.1 Installation-wide Surveys

Fort Jackson has surveyed the installation for additional populations of smooth coneflower, rough-leaved loosestrife, and other rare plant species by completing two installation-wide surveys in 1992 and 1995-1996. Additionally, an inventory for threatened and endangered plant species was conducted across the training areas licensed to the South Carolina National Guard in 2010 (Gaddy 2010). No areas suspected of containing UXO, including the EIA, were surveyed. No additional populations of any threatened or endangered species have been located during these surveys.

If critical habitat is listed in the future, this plan will be modified to incorporate the new requirements. Because of the potential danger from UXO, hazardous chemicals, and the unpredictability in planning and obtaining access, the EIA and any other hazardous areas will be excluded from future threatened and endangered plant surveys.

4.3.2 Project Surveys

A project survey will entail a specific survey of the site of a proposed project or activity. Only the area within the boundaries of the proposed project which represents suitable habitat for threatened or endangered species listed for Richland County will be surveyed. Project surveys will not be conducted specifically for smooth coneflower since it has been determined that there is no determinable habitat on Fort Jackson. Project areas will be surveyed for rough-leaved loosestrife if wetlands will be impacted, and the affected wetlands are considered suitable habitat and have been prescribed burned. Wetlands that have been exposed to frequent fire are more likely to harbor rough-leaved loosestrife. Bottomland hardwood wetlands that have not been exposed to this type of fire regime are not likely to support this species. Proposed project areas in the EIA and any other hazardous areas will not be surveyed due to the potential hazard to personnel.

5.0 IMPLEMENTATION COSTS

Fiscal Year	Species	Man Hours	Cost	Materials	Total
2015	*E. laevigata*	102	$5,338	$600	$5,939
	L. asperulaefolia	32	$1,674	$0	$1,674
Sum 2015		134	$7,012	$600	$7,612
2016	*E. laevigata*	42	$2,200	$50	$2,250
	L. asperulaefolia	64	$3,348	$50	$3,398
Sum 2016		106	$5,548	$100	$5,648
2017	*E. laevigata*	74	$3,874	$100	$3,974
	L. asperulaefolia	64	$3,348	$50	$3,398
Sum 2017		138	$7,222	$150	$7,372
2018	*E. laevigata*	42	$2,200	$50	$2,250
	L. asperulaefolia	32	$1,674	$0	$1,674
Sum 2018		74	$3,874	$50	$3,924
2019	*E. laevigata*	74	$3,874	$100	$3,974
	L. asperulaefolia	64	$3,348	$50	$3,398
Sum 2019		138	$7,222	$150	$7,372
Total 2015-2019		590	$30,878	$1,050	$31,928

Table 5. Projected five-year annual cost estimates for the implementation of Fort Jackson's Flora ESMC.

6.0 ESMC CHECKLIST

The ESMC checklist (Table 6) is provided in order to assist an outside agency in reviewing the compliance of the installation with regard to this ESMC. The checklist includes major management objectives with their estimated time of implementation.

Table 6. Checklist for the Endangered Species Management Component

FY (Quarter*)	ACTIVITY	DATE COMPLETED
FY15 (1 Oct 2014 – 30 Sept 2015)		
1st	Maintain signs around smooth coneflower site	_____
	Monitor smooth coneflower site for training related damage	_____
	Prepare annual report to USFWS	_____
	Conduct environmental awareness training	_____
2nd	Assess effectiveness of anti-erosion measures of both species	_____
	Clear woody vegetation from smooth coneflower population if needed	_____
	Repair the fencing around the smooth coneflower site	_____
	Repair wire exclusions around smooth coneflower plants	_____
	Monitor smooth coneflower site for training related damage	_____
	Prescribed burn the smooth coneflower site	_____
	Prescribed burn the rough-leaved loosestrife site	
	Conduct environmental awareness training	_____
3rd	Monitor and inventory both species' populations	_____
	Monitor smooth coneflower site for training related damage	_____
	Conduct environmental awareness training	_____
4th	Monitor smooth coneflower site for training related damage	_____
	Conduct environmental awareness training	_____
FY16 (1 Oct 2015 – 30 Sept 2016)		
1st	Harvest achenes from smooth coneflower	_____
	Maintain seedbeds and sow smooth coneflower achenes	_____
	Maintain signs around smooth coneflower site	_____
	Monitor smooth coneflower site for training related damage	_____
	Prepare annual report to USFWS	_____
	Conduct environmental awareness training	_____
2nd	Assess effectiveness of anti-erosion measures of both species	_____
	Clear woody vegetation from smooth coneflower population if needed	_____
	Maintain the fencing around the smooth coneflower site	_____
	Maintain wire exclusions around smooth coneflower plants	_____
	Monitor smooth coneflower site for training related damage	_____
	Prescribed burn the rough-leaved loosestrife site	_____
	Conduct environmental awareness training	_____

Table 5, (cont). Checklist for the Endangered Species Management Component

3rd	Monitor and inventory both species' populations	_____
	Provide maps to Range Operations	_____
	Monitor smooth coneflower site for training related damage	_____
	Conduct environmental awareness training	_____
4th	Monitor smooth coneflower site for training related damage	_____
	Conduct environmental awareness training	_____

FY17 (1 Oct 2016 – 30 Sept 2017)

1st	Harvest achenes from smooth coneflower	_____
	Maintain seedbeds and sow smooth coneflower achenes	_____
	Maintain signs around smooth coneflower site	_____
	Monitor smooth coneflower site for training related damage	_____
	Prepare annual report to USFWS on the ESMC	_____
	Prepare annual report to USFWS on Section 10 permit	_____
	Conduct environmental awareness training	_____
2nd	Assess effectiveness of anti-erosion measures of both species	_____
	Clear woody vegetation from smooth coneflower population if needed	_____
	Maintain the fencing around the smooth coneflower site	_____
	Maintain wire exclusions around smooth coneflower plants	_____
	Monitor smooth coneflower site for training related damage	_____
	Prescribed burn the smooth coneflower site	_____
	Conduct environmental awareness training	_____
3rd	Monitor and inventory both species' populations	_____
	Provide maps to Range Operations	_____
	Monitor smooth coneflower site for training related damage	_____
	Prescribed burn the rough-leaved loosestrife site	_____
	Conduct environmental awareness training	_____
4th	Monitor smooth coneflower site for training related damage	_____
	Conduct environmental awareness training	_____

FY18 (1 Oct 2017 – 30 Sept 2018)

1st	Harvest achenes from smooth coneflower	_____
	Maintain seedbeds and sow smooth coneflower achenes	_____
	Maintain signs around smooth coneflower site	_____
	Monitor smooth coneflower site for training related damage	_____
	Prepare annual report to USFWS on the ESMC	_____
	Prepare annual report to USFWS on Section 10 permit	_____
	Conduct environmental awareness training	_____

Table 5, (cont.). Checklist for the Endangered Species Management Component

2nd	Assess effectiveness of anti-erosion measures of both species	_____
	Clear woody vegetation from smooth coneflower population if needed	_____
	Maintain the fencing around the smooth coneflower site	_____
	Maintain wire exclusions around smooth coneflower plants	_____
	Monitor smooth coneflower site for training related damage	_____
	Conduct environmental awareness training	_____
3rd	Monitor and inventory both species' populations	_____
	Provide maps to Range Operations	_____
	Monitor smooth coneflower site for training related damage	_____
	Conduct environmental awareness training	_____
4th	Monitor smooth coneflower site for training related damage	_____
	Conduct environmental awareness training	_____

FY19 (1 Oct 2018 – 30 Sept 2019)

1st	Harvest achenes from smooth coneflower	_____
	Maintain seedbeds and sow smooth coneflower achenes	_____
	Maintain signs around smooth coneflower site	_____
	Monitor smooth coneflower site for training related damage	_____
	Prepare annual report to USFWS on the ESMC	_____
	Prepare annual report to USFWS on Section 10 permit	_____
	Conduct environmental awareness training	_____
2nd	Assess effectiveness of anti-erosion measures of both species	_____
	Clear woody vegetation from smooth coneflower population if needed	_____
	Maintain the fencing around the smooth coneflower site	_____
	Maintain wire exclusions around smooth coneflower plants	_____
	Monitor smooth coneflower site for training related damage	_____
	Prescribed burn the smooth coneflower site	_____
	Conduct environmental awareness training	_____
3rd	Monitor and inventory both species' populations	_____
	Provide maps to Range Operations	_____
	Monitor smooth coneflower site for training related damage	_____
	Prescribed burn the rough-leaved loosestrife site	_____
	Conduct environmental awareness training	_____
4th	Monitor smooth coneflower site for training related damage	_____
	Conduct environmental awareness training	_____

*1st Quarter (October – December)
2nd Quarter (January – March)
3rd Quarter (April – June)
4th Quarter (July – September)

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DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT JACKSON
4325 JACKSON BOULEVARD
FORT JACKSON SC 29207-5015

March 26, 2015

Environmental Division

Thomas D. McCoy, Acting Field Supervisor
U.S. Fish and Wildlife Service
Charleston Field Office
176 Croghan Spur Road, Suite 200
Charleston, South Carolina 29407

Dear Mr. McCoy:

I have enclosed a copy of a Biological Assessment (BA) for our Endangered Species Management Component (ESMC) for the Smooth coneflower (*Echinacea laevigata)* and Rough-leaved loosestrife (*Lysimachia asperulaefolia)* on Fort Jackson in Richland County, South Carolina.

This document is a revision of the flora ESMC that Fort Jackson prepared in March 2007 and the USFWS approved by submittal of a Biological Opinion dated April 23, 2007, (USFWS Log. No. 42410-2007-I-0395).

The purpose of our BA is to provide the FWS with sufficient factual and scientific information based on the "best scientific and commercial data available" {16 U.S.C. 1536(a)(2)}. Our BA conclusion is that our action may affect but is not likely to adversely affect threatened/endangered plant and animal species listed in Richland County.

I request that the FWS concur with our finding in the BA, and that you respond to us at your earliest convenience. If you have any questions or need additional information, please contact Mr. Stanley Rikard, Wildlife Biologist, at (803) 751-5376.

Sincerely,

Thomas L. Robertson
Director of Public Works

Biological Assessment

Endangered Species Management Component for the Smooth coneflower (*Echinacea laevigata)* and Rough-leaved loosestrife (*Lysimachia asperulaefolia)*

Fort Jackson, Richland County, South Carolina

Prepared By:

U.S. Army Garrison, Fort Jackson
Directorate of Public Works
Environmental Division
Wildlife Branch

Introduction

Army Regulation 200-1 requires appropriate Army installations to prepare an installation natural resources management plan (INRMP). The flora endangered species management component (ESMC) is a component of that plan that details how the installation will manage two federally endangered plant species known to exist on Fort Jackson.

Attachment 1 to this Biological Assessment is a revised ESMC for the smooth coneflower (*Echinacea laevigata)* and rough-leaved loosestrife (*Lysimachia asperulaefolia).* This document is a revision of the flora ESMC that Fort Jackson prepared in March 2007 and the U.S. Fish and Wildlife Service (USFWS) approved by submittal of a Biological Opinion dated April 23, 2007, (USFWS Log. No. 42410-2007-I-0395).

A draft of the revised flora ESMC was sent to the USFWS in November 2014 for comment as part of the ongoing informal consultation on the management of endangered plant species.

The objective of the flora ESMC is to conserve rare, threatened and endangered plant species as required by the ESA of 1973 as amended, while preserving military training readiness and other mission requirements of Fort Jackson. The purposes of the flora ESMC are to: (1) define conservation goals for smooth coneflower (*Echinacea laevigata*) and rough-leaved loosestrife (*Lysimachia asperulaefolia*), federally listed endangered plant species on Fort Jackson; (2) outline a plan for management of these plant species and their habitat that will enable achievement of conservation goals, and; (3) summarize the cost of conservation efforts and impacts on installation activities.

The recovery plans for rough-leaved loosestrife and smooth coneflower that have been developed by the USFWS include conservation measures that have been incorporated into the flora ESMC. In addition, comments from the USFWS on the draft flora ESMC have also been incorporated.

The purpose of this Biological Assessment is to evaluate the implementation of the flora ESMC and assess the anticipated impact to federally listed threatened/endangered animal and plant species and their habitat on Fort Jackson. The U.S. Fish and Wildlife Service (USFWS) will use this information in preparation of a Biological Opinion (BO), if needed, for this flora ESMC.

Revisions to the March 2007 Flora ESMC

Changes to the 2007 flora ESMC included primarily formatting, updating images and tables, condensing species information, and updating the population data for both species, as well as providing a summary of historical management of each population on Fort Jackson. In addition, the following three changes were made in the revised flora ESMC:

(1) The 2007 version indicated that management for the red-cockaded woodpecker (RCW) would not impact management for the smooth coneflower. However, the smooth

coneflower site falls within the half-mile foraging partition for at least one future recruitment cluster and is subject to ecosystem restoration and management activities prescribed by the RCW ESMC (Section 2.3.3).

(2) In the 2007 version, it was stated that a portion of the smooth coneflower site would be burned in the dormant season and a portion would be burned during the growing season, and that evaluations would be made to determine which burn regime is better. Because no positive effect was seen with either strategy, Fort Jackson plans to revert back to a late dormant season burn on a 2 year rotation. Fort Jackson will closely monitor the vegetative response to determine if a change is needed during the period covered by the revised flora ESMC. Additionally, Fort Jackson has reached out to other land managers with growing populations of smooth coneflower for advice on how to burn for this species (Section 2.4.2).

(3) Fort Jackson proposes to return the rough-leaved loosestrife site to a 1-2 year burn rotation, preferably executed in late winter or early spring. Results of burning will be monitored as closely as possible to determine if this fire regime is meeting management goals for the rough-leaved loosestrife. Adjustments to the burning regime will be made based on population response (Section 3.4.2).

These revisions are not considered major modifications to the way these two plant species have been managed in the past on Fort Jackson. It is anticipated that the revisions may affect but are not likely to adversely affect the smooth coneflower, the rough-leaved loosestrife, and the red-cockaded woodpecker. In addition, it is anticipated that the revisions will have no affect on other federally listed threatened/endangered animal and plant species and their habitat in Richland County that are listed in following sections.

Methods

Stanley Rikard of the Fort Jackson Wildlife Branch has reviewed a January 8, 2015, USFWS list of all federally listed threatened/endangered (T&E) animal and plant species (Endangered Species Act, 1973, as amended) known in Richland County, South Carolina. The list is Attachment 2 to this document. The T&E animal species the USFWS lists are red-cockaded woodpecker as endangered, wood stork as threatened, atlantic sturgeon as endangered, and the shortnose sturgeon as endangered. The T&E plant species listed are canby's dropwort as endangered, georgia aster as a candidate species, rough-leaved loosestrife as endangered, and the smooth coneflower as endangered. Each of these species is discussed in the *Results* section of this BA regarding their presence and the effects the revised flora ESMC may have on them.

Results

Red-cockaded woodpecker (Picoides borealis)

The smooth coneflower site falls within the half-mile foraging partition for at least one future recruitment cluster and is subject to ecosystem restoration and management activities prescribed by the RCW ESMC. It is felt that the proposed management of the smooth coneflower as written

in the attached flora ESMC may affect but is not likely to adversely affect the red-cockaded woodpecker and its habitat.

The rough-leaved loosestrife site is located in the east impact area and this site is contaminated with unexploded ordnance. The location of loosestrife is within the RCW Limited Management Area (LMA), but is not in RCW habitat. The surrounding area that will be subject to prescribed fire for loosestrife management is RCW habitat and part of the LMA. The burning for the loosestrife will benefit the conservation of RCW habitat that surrounds the plant population. It is felt that the proposed management of the rough-leaved loosestrife as written in the attached flora ESMC may affect but is not likely to adversely affect the red-cockaded woodpecker and its habitat.

Wood stork (Mycteria Americana)

Neither the smooth coneflower site nor the rough-leaved loosestrife site contains suitable habitat for the wood stork.

It is felt that the proposed management of the smooth coneflower and the rough-leaved loosestrife as written in the attached flora ESMC will have no effect on the wood stork.

Atlantic sturgeon (Acipenser oxyrinchus)

Neither the smooth coneflower site nor the rough-leaved loosestrife site contains suitable habitat for the Atlantic sturgeon.

It is felt that the proposed management of the smooth coneflower and the rough-leaved loosestrife as written in the attached flora ESMC will have no effect on the Atlantic sturgeon.

Shortnose sturgeon (Acipenser brevirostrum)

Neither the smooth coneflower site nor the rough-leaved loosestrife site contains suitable habitat for the shortnose sturgeon.

It is felt that the proposed management of the smooth coneflower and the rough-leaved loosestrife as written in the attached flora ESMC will have no effect on the shortnose sturgeon.

Canby's dropwort (Oxypolis canbyi)

Fort Jackson had endangered species surveys conducted in 1992, 1995, and 1996. No populations of Canby's dropwort were identified. There appears to be no suitable habitat for this species on Fort Jackson in general according to the S.C. Department of Natural Resources Heritage Botanist, Dr. Bert Pittman.

It is felt that the proposed management of the smooth coneflower and the rough-leaved loosestrife as written in the attached flora ESMC will have no effect on Canby's dropwort.

Georgia aster (Aster georgianus)

Fort Jackson had endangered species surveys conducted most recently in 1995 and 1996. Georgia aster was not a species of concern at that time in Richland County. Since that time the species has been determined to be a candidate species and the USFWS informed Fort Jackson in 2002 that this designation does not afford it any legal protection under the Endangered Species Act. Dr. Bert Pittman, S.C. Department of Natural Resources Heritage Botanist, indicates that Fort Jackson does not have suitable habitat for this species.

It is felt that the proposed management of the smooth coneflower and the rough-leaved loosestrife as written in the attached flora ESMC will have no effect on Georgia aster.

Rough-leaved loosestrife (Lysimachia asperulaefolia)

The revisions incorporated in the flora ESMC are not considered major modifications to the way this plant species has been managed in the past on Fort Jackson. It is anticipated that the revisions may affect but is not likely to adversely affect the rough-leaved loosestrife.

Smooth coneflower (Echinacea laevigata)

The revisions incorporated in the flora ESMC are not considered major modifications to the way this plant species has been managed in the past on Fort Jackson. It is anticipated that the revisions may affect but is not likely to adversely affect the smooth coneflower.

Conclusions

Based on the information provided in this BA, Fort Jackson has concluded that the revised flora ESMC for the smooth coneflower and rough-leaved loosestrife may affect but is not likely to adversely affect the smooth coneflower, the rough-leaved loosestrife, and the red-cockaded woodpecker. It is also concluded that the revisions incorporated in the flora ESMC will have no affect on other threatened/endangered animal or plant species listed in Richland County, South Carolina..

If at any time during the life of the revised flora ESMC, additional information is discovered that would require a modification of this assessment, informal Section 7 consultation will be reinitiated.

The concurrence of the USFWS with the findings of this BA is requested.

South Carolina List of At-Risk, Candidate, Endangered, and Threatened Species - Richland County

*	Contact National Marine Fisheries Service (NMFS) for more information on this species
**	The U.S. Fish and Wildlife Service (FWS) and NMFS share jurisdiction of this species
ARS	At-Risk Species - Species that the FWS has been petitioned to list and for which a positive 90-day finding has been issued (listing may be warranted); information is provided only for conservation actions as no Federal protections currently exist.
BGEPA	Federally protected under the Bald and Golden Eagle Protection Act
C	FWS or NMFS has on file sufficient information on biological vulnerability and threat(s) to support proposals to list these species
CH	Critical Habitat
E	Federally Endangered
P or P - CH	Proposed for listing or critical habitat in the Federal Register
S/A	Federally protected due to similarity of appearance to a listed species
T	Federally Threatened

COUNTY	CATEGORY	COMMON NAME	SCIENTIFIC NAME	STATUS
Richland	Amphibian	Chamberlain's dwarf salamander	*Eurycea chamberlaini*	ARS
	Bird	Bald eagle	*Haliaeetus leucocephalus*	BGEPA
	Bird	Red-cockaded woodpecker	*Picoides borealis*	E
	Bird	Wood stork	*Mycteria americana*	T
	Crustacean	Little River (Broad River spiny) crayfish	*Cambarus spicatus*	ARS
	Fish	American eel	*Anguilla rostrata*	ARS
	Fish	Atlantic Sturgeon*	*Acipenser oxyrinchus**	E
	Fish	Blueback herring	*Alosa aestivalis*	ARS
	Fish	Robust redhorse	*Moxostoma robustum*	ARS
	Fish	Shortnose sturgeon*	*Acipenser brevirostrum**	E
	Insect	None Found		
	Mammal	None Found		
	Mollusk	Savannah lilliput	*Toxolasma pullus*	ARS
	Plant	Bog spicebush	*Lindera subcoriacea*	ARS
	Plant	Canby's dropwort	*Oxypolis canbyi*	E
	Plant	Carolina-birds-in-a-nest	*Macbridea caroliniana*	ARS
	Plant	Ciliate-leaf tickseed	*Coreopsis integrifolia*	ARS
	Plant	Georgia aster	*Symphyotrichum georgianum*	C
	Plant	Purple balduina	*Balduina atropurpurea*	ARS
	Plant	Rough-leaved loosestrife	*Lysimachia asperulaefolia*	E
	Plant	Sandhills lily	*Lilium pyrophilum*	ARS
	Plant	Smooth coneflower	*Echinacea laevigata*	E
	Plant	Spathulate seedbox	*Ludwigia spathulata*	ARS
	Reptile	Southern hognose snake	*Heterdon simus*	ARS

These lists should be used only as a guideline, not as the final authority. The lists include known occurrences and areas where the species has a high possibility of occurring. Records are updated as deemed necessary and may differ from earlier lists.

For a list of State endangered, threatened, and species of concern, please visit https://www.dnr.sc.gov/species/index.html.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
176 Croghan Spur Road, Suite 200
Charleston, South Carolina 29407

June 19, 2015

Mr. Thomas L. Robertson
Department of the Army
Directorate of Public Works
2562 Essayons Way
Fort Jackson, SC 29207-5608

Re: Biological Assessment, Ft. Jackson Army Installation, South Carolina
FWS Log No.: 2015-I-0380

Dear Mr. Robertson:

The U.S. Fish and Wildlife Service (Service) has received a copy of the Biological Assessment (BA) for the Endangered Species Management Component (ESMC) at Fort Jackson Army Training Base, Richland County, South Carolina. Overall, the BA was developed to address potential impacts from military operations and management actions for federally protected threatened and endangered (T&E) species that may occur on the installation. The ESMC of the BA has been revised with respect to T&E and you are requesting concurrence in accordance section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (ESA).

The submitted ESMC is a revision from the 2007 ESMC document specifically addressing the potential impacts to the rough-leafed loosestrife and smooth coneflower. Revisions described in the ESMC concern prescribed burning schedules implemented to foster management of the above species which are found on the Fort Jackson installation. Previous management actions entailed burning a portion of the habitat during the growing season and another portion during the dormant season. The purpose was to evaluate if one burning regime provided more benefits over the other; however, no positive benefits were detected. Therefore, Fort Jackson intends to revert back to performing only dormant season burns (late winter to early spring) on a two year cycle. Results of the two year burning schedule will be evaluated to determine if it will meet management goals.

Revisions to the burning regime do not represent a major modification to management actions on the installation. Fort Jackson has determined that this action may affect, but is not likely to adversely affect, the smooth coneflower or the rough-leafed loosestrife. In addition, Fort Jackson concluded that this prescribed burning regime may affect, but is not likely to adversely affect, the red-cockaded woodpecker. Based on the information provided, the Service concurs

with your determination that the reversion to a dormant season burn is not likely to adversely affect the rough-leaved loosestrife, smooth coneflower, or the red-cockaded woodpecker. Therefore, the requirements of section 7 of the ESA have been fulfilled relative to the proposed action, and no further consultation is necessary at this time.

Please note that obligations under the ESA must be reconsidered if: (1) new information reveals impacts of this identified action may affect any listed species or critical habitat in a manner not previously considered; (2) this action is subsequently modified in a manner, which was not considered in this assessment; or (3) a new species is listed or critical habitat is designated that may be affected by the identified action.

If you have any questions or comments or require additional information regarding this letter, please contact Mr. Mark Caldwell of my staff at 843-727-4707 x 215, and reference FWS Log No. 2015-I-0380.

Sincerely,

Thomas D. McCoy

Thomas D. McCoy
Field Supervisor

TDM/MAC

APPENDIX 4
MIGRATORY BIRD MANAGEMENT

1. MIGRATORY BIRD MANAGEMENT

There is a continental-wide concern over declining numbers of many nongame birds, especially neotropical migratory birds and many resident landbird species. In September 2014, the U.S. Fish and Wildlife Service and the Department of Defense, signed a memorandum of understanding (MOU) to outline the responsibilities of each agency in the protection of migratory birds. Both parties agree that migratory birds are important components of biological diversity and that the conservation of migratory birds will both help sustain ecological systems and help meet the public demand for conservation education and outdoor recreation, such as wildlife viewing and hunting opportunities. The parties also agree that it is important to: 1) focus on bird populations; 2) focus on habitat restoration and enhancement where actions can benefit specific ecosystems and migratory birds dependent upon them; and 3) recognize that actions taken to benefit some migratory bird populations may adversely affect other migratory bird populations.

Military lands like Fort Jackson contain habitat building blocks, especially in area where human impacts have been minimized. The goal of Fort Jackson's bird conservation efforts is to maintain fully functioning natural ecosystems that can provide for the needs of various and differing species. Maintaining ecological processes and the species that depend on them across landscapes that are intensively used by people is essential to planning.

By incorporating holistic ecosystem management into the Integrated Natural Resources Management Plan (INRMP), Fort Jackson is adopting habitat based conservation measures grounded in sound science, effective partnerships, and adaptive natural resources management that will benefit bird conservation. In some cases, training activities help maintain healthy, functioning ecosystems, such as grassland dependent upon periodic fires, or benefit birds, such as those that require some light ground disturbance. Additionally, conserving wildlife habitats and biodiversity helps minimize future listings of species.

Fort Jackson will utilize information from Partners In Flight (www.dodpif.org) which provides a scientific foundation for DoD to maximize effectiveness of management resources, enhance the biological integrity of our lands, and ensure continued use of lands to fulfill military training requirements. Participating in broad-scale partnerships also helps us to more effectively meet our trust responsibility to conserve our nation's biodiversity.

Fort Jackson will implement the requirement of the MOU between USFWS and DoD to include the following. Prior to starting any activity that is likely to affect populations of migratory birds:

a. Identify the migratory bird species likely to occur in the area of the proposed action, and determine if any species of concern could be affected by the activity.

b. Assess and document through the project planning process, using NEPA when applicable, the effect of the proposed action on species of concern. Using the best available demographic, population, or habitat association data in the assessment of effects upon the species of concern.

c. Engage in early planning and scoping with the USFWS relative to the potential impacts of a proposed action, to proactively address migratory bird conservation, and to initiate appropriate actions to avoid or minimize the take of migratory birds.

2. Inventory and Monitoring

To date, 141 bird species have been identified on Fort Jackson through inventory and monitoring efforts.

The earliest bird surveys conducted on Fort Jackson began in 1990 with a two-year survey for rare, threatened and endangered bird species performed by the S.C. Wildlife and Marine Resources Department. During 1992 and 1993, breeding bird surveys were performed in association with the Land Condition Trend Analysis (LCTA) component of the ITAM program. These earliest surveys collectively identified 98 species.

Beginning in 2004, the Monitoring Avian Productivity and Survivorship (MAPS) program was implemented on Fort Jackson by the S.C. Army National Guard. This effort has continued uninterrupted since its inception. A second MAPS station was established on Fort Jackson by the Wildlife Branch in 2008.

Monitoring of approximately 120 Wood Duck nest boxes began in 1989 and has continued annually. In addition, nest boxes have been maintained and monitoring performed for American Kestrels since 1995. Currently, there are 56 Kestrel nest boxes maintained on the installation.

Annual surveys are performed for the Bobwhite Quail (call counts) and Eastern Wild Turkey (brood/poult sightings) on Fort Jackson as part of annual state-wide surveys by the SCDNR. The Bobwhite Quail survey has been performed on Fort Jackson since 1987.

Annual Nightjar surveys are also performed to contribute data to the Nightjar Survey Network, Center for Conservation Biology, at the College of William and Mary, Williamsburg, Virginia. This data helps determine the population distribution and trends of nightjar species across the United States.

3. Habitat Conservation (protection, restoration, and enhancement)

Among the responsibilities specified in the MOU is the protection, restoration, enhancement, and management of habitats for migratory birds. Five specific strategies are outlined:

a. Identify management actions that have the potential to adversely affect populations of migratory birds; develop and implement conservation measures that would avoid or minimize the take of migratory birds or enhance the quality of habitat used by migratory birds.

b. Work with conservation partners to identify and preserve Important Bird Areas and other significant bird conservation sites that occur on DoD-managed lands.

c. Prevent or abate the pollution or degradation of migratory bird habitat.

d. Develop and conduct outreach about migratory birds.

e. Control the introduction, establishment, and spread of invasive species that might be harmful to migratory birds.

4. Collaboration

The MOU defines collaboration as working with internal stakeholders and other Federal and State agencies to develop reasonable and effective conservation measures for actions that affect migratory birds and their natural habitats. Specifically, the MOU states as a responsibility of DoD the participation in or promotion of existing regional and national inventory and monitoring programs such as Breeding Bird Survey (BBS), BBIRD, Christmas Bird Counts, bird atlas projects, or game bird surveys (e.g., mid-winter waterfowl surveys) on DoD lands where practicable and feasible. Collaboration also includes sharing inventory, monitoring, research, and study data for breeding, migrating, and wintering bird populations and habitats with national data repositories such as Breeding Bird Research and Monitoring Database (BBIRD), National Point Count Database, National Biological Information Infrastructure, and MAPS.

5. Cooperation

DoD responsibilities regarding cooperation are to allow the USFWS and other partners reasonable access to military lands for conducting sampling or survey programs. Furthermore, existing partnerships and/or new ones should be used to facilitate combined funding for inventory, monitoring, management, and research.

6. Outreach & Public Access

Migratory bird conservation efforts will succeed only if the public support them, so outreach and education is critically important. A variety of outreach activities are conducted on Fort Jackson to

educate the public about threats to bird populations and the work installation biologists are performing to conserve birds.

Fort Jackson was designated an Important Bird Area (IBA) in 2006 based on; presence of Endangered bird species, WatchList Species, and Species Assemblage Associated with a Representative, Rare or Threatened Habitat Type (the Longleaf Pine Ecosystem). At the time of designation, Fort Jackson was one of 41 IBAs recognized in South Carolina.

Public access refers to the promotion of migratory birds and their conservation. Fort Jackson provides access for outdoor recreation, including wildlife viewing. The Wildlife Branch developed a birding brochure providing a checklist of birds documented on the installation. Articles are regularly published in the Fort Jackson Leader (newspaper) promoting wildlife viewing on Fort Jackson. Additional promotional material from PIF and other organizations are provided to the public, including the "Don't Let Your Cats Go AWOL!" brochure and a booklet describing DoD Partners in Flight bird management goals and objectives. Public access for bird viewing is available along the section of the Palmetto Trail that traverses Fort Jackson, and along the S.C. National Guard's Harry J. Vann Interpretive Trail. The Vann Trail is a public hiking trail along the installation's southern boundary within the area licensed to the S.C. National Guard and is a spur off the Palmetto Trail.

7. Integration

The integration of monitoring and management priorities of state, regional, national, and international bird conservation plans into Fort Jackson's goals helps to ensure that the installation is meeting the responsibilities set forth in the MOU. Specific goals and priorities for inventory and monitoring, habitat conservation, cooperation, collaboration, and outreach are provided in the following plans:

- North American Bird Conservation Initiative
- Partners in Flight
- North American Waterfowl Management Plan
- State Wildlife Action Plans
- National Bobwhite Conservation Initiative

Whenever possible, priorities from these and other applicable conservation plans or strategies will be incorporated into Fort Jackson's INRMP.

8. Regulations

Provisions of the Migratory Bird Treaty Act and other federal laws and regulations require that all appropriate licenses and permits be obtained for bird banding, scientific collection, taxidermy, special purposes, and depredation activities. Fort Jackson's Wildlife Branch is responsible for maintaining current state and federal permits relating to these activities performed by Fort Jackson

personnel, and ensuring that cooperators working on the installation also possess the appropriate permits.

INTEGRATED WILDLAND FIRE MANAGEMENT PLAN (IWFMP)

U.S. ARMY GARRISON FORT JACKSON

Approved by:

MICHAEL S. GRAESE
COL, AD
Commanding

19 December 2012

Prepared By:
Environmental Division
Forestry Branch

FJ 4.4.6LF2

1. INTRODUCTION

Fort Jackson is the largest and most active initial Entry Training Center in the United States Army. Fort Jackson provides basic combat training for half of all Army Soldiers and 69 percent of all female Soldiers entering the United States Army. The top priority is training Soldiers to take their place in today's Army. With more than 51,000 acres and 53 ranges and field training sites, Fort Jackson offers young Soldiers the opportunity to train in a demanding, realistic environment. Fort Jackson supports several other training missions, including two Advanced Individual Training schools, the United States Army Soldier Support Institute, the United States Army Drill Sergeant School, Armed Forces Chaplaincy Center and School, and the National Center for Credibility Assessment. Fort Jackson's mission requires the use of munitions, weapon systems and training scenarios that often increase the chances of wildfire ignition. Wildfires pose a significant threat to firefighter and public safety and can adversely impact the ability of Soldiers to train. In addition, wildfires can have adverse impacts on natural resources, historic properties, man-made structures, utilities, air and water quality and the military training lands of Fort Jackson. It is the goal and intent of the Fort Jackson's Environmental Division (ENV) to reduce and prevent the number of wildfires each year. It is the ENV's intent to preserve all training land and to support the training mission by reducing the number and size of wildfires, while conducting beneficial prescribed burning. Fort Jackson is currently home to one animal and two plant species listed as endangered on the federal endangered species list; the red-cockaded woodpecker (RCW), smooth coneflower, and rough-leaved loosestrife. Prescribe fire, especially growing season fire, is necessary to sustain these species and contribute to their recovery. It is also important for maintaining the longleaf pine ecosystem and its associated fire-dependent plants and animals.

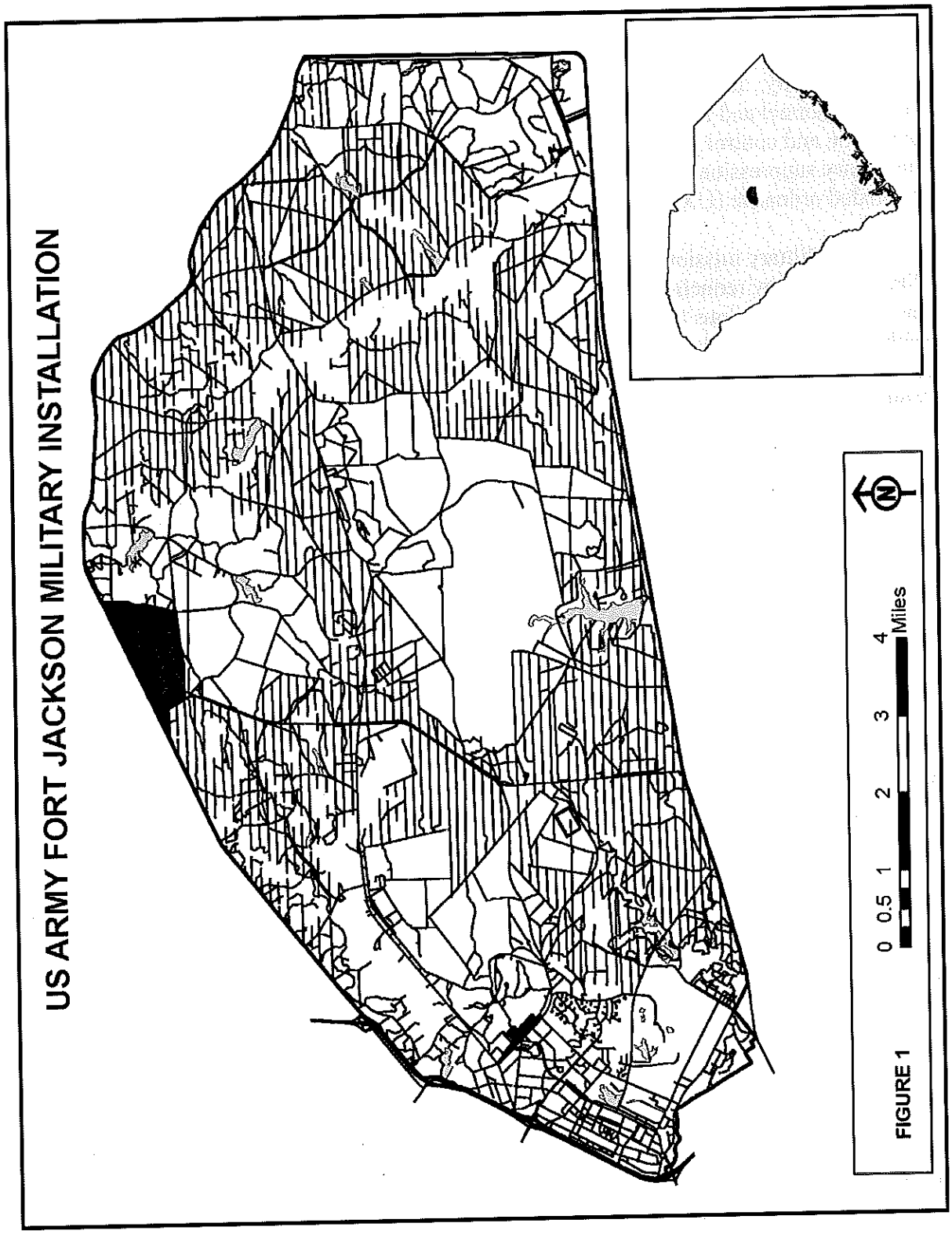
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FIGURE 1

D. Organizational Structure and Responsibilities

(1) Forestry Branch Chief. Responsible for ensuring the Integrated Wildland Fire Management Plan and all other related plans or regulation are being followed by Environmental Natural Resource personnel and DoD civilian contractors working in ENV. As such, the Forestry Branch Chief is the Wildland Fire Program Manager (WFPM). The WFPM requests funds from higher headquarters to purchase equipment, supplies, and pay for wildland fire expenses. The WFPM ensures that prescribe fire plans are integrated, SOPs, directives, and other fire management related information is distributed to everyone involved with wildland fire on the installation. The WFPM is ultimately responsible for all wildland fires that occur on Fort Jackson.

(2) Fire Management Officer (FMO). Responsible for developing and implementing the installation Wildland Fire Management Plan and all other related plans or regulation on Fort Jackson. The FMO develops burn prescriptions, oversees wildfire suppression activities, and determines levels of training required to conduct wildland fire management. The FMO develops annual prescribed burn plans in conjunction with Training Support Division, Wildlife Branch, Forestry Branch, and other Environmental Division components. Also coordinates daily burn activities through Training Support Division, Range Operations, McCrady Training Center (MTC), and MWR Outdoor Recreation. Creates GIS maps and maintains wildland fire records and documentation. Contacts all necessary Fort Jackson and off-post personnel regarding areas to be burned that day. Oversees' the grading of all unimproved dirt roads and firebreaks on Fort Jackson (excluding McCrady Training Site license area). The FMO serves as the Contracting Officer's Representative (COR) for the aerial ignition contractor, conducts and directs aerial ignition operations. The FMO oversees fire tower staffing and operations. The FMO reports to the Forestry Branch Chief.

(3) Assistant Fire Management Officer (AFMO). Responsible for directing daily wildland fire activities and scheduling, organizing and disseminating fire crews according to the information provided by the FMO. Ensures burn units are prepared in advance for burning. Assists the FMO when needed. Participates in prescribed burn activities. Collects field data for post burn evaluations. Collects photo plot data for 15 photo plots, including taking photos annually, and collecting vegetation data every 3 years. AFMO is available for fire suppression activities, fire tower duty, and a variety of different capacities at other times within the Forestry Branch. AFMO reports to the FMO.

(4) Forestry Branch and Wildlife Branch Personnel. Have their own program areas, but are responsible for preparing burn units, maintaining fire equipment, and executing the prescribed burn. They are available for fire suppression activities, fire tower duty, and a variety of different capacities at other times within the Forestry and/or Wildlife Branch. Forestry and Wildlife Branch personnel report to the FMO, while participating in wildland fire activities.

(5) Equipment Operator. Ensures all roads and firebreaks are kept passable and free of hazardous fuels. Maintains and services all heavy equipment to ensure ready status at all times. Participates in prescribed burn activities, available for fire suppression activities, fire tower duty, and a variety of different capacities at other times within the Forestry Branch. Equipment Operator reports to the FMO.

degree arc downwind from the burn, the author of the prescription must consider possible wind direction shifts, and down-drainage smoke drift in all directions. Portable, highly reflective smoke signs may be needed, if burning near highways, major roads or housing areas. A minimum of two signs should be used. The signs should be placed approximately ½ mile on either side of the burn unit along the road shoulder. Smoke signs should be left out overnight, and collected the next day, if there is not a persistent smoke problem.

(b) During the ignition phase, a small test fire will be lit to determine if wind conditions are within prescription. If not, the burn boss suppresses the test fire and cancels the burn. If during the burn the wind switches to an unfavorable direction; the fire may be suppressed. Anytime smoke becomes a problem on a highway on or off the installation, the burn boss will immediately notify the Forestry Branch Chief, and the Fort Jackson 911 Center to request Directorate of Emergency Services (DES) Law Enforcement traffic control. The burn boss should cease all ignitions when it is safe to do so, and position forestry vehicles with red flashing lights at each end of the smoke to warn and slow down traffic until DES Law Enforcement arrives. If smoke becomes a problem on a highway off the installation, the burn boss will immediately coordinate with the Forestry Branch Chief and the Fort Jackson 911 Center to contact the South Carolina Highway Patrol for assistance with traffic control. Fort Jackson personnel will assist with traffic control if able, until Law Enforcement arrives on the scene.

(c) Once the burn has been completed, mop up will be done, depending on the circumstance. All unburned fuels next to the perimeter should be burned out. All snags that are tall enough to fall across perimeter breaks or onto roads will be cut with a saw or pushed with a tractor/plow into the burned area. Any live trees that are on fire and in danger of falling across the perimeter break or onto roads will be extinguished with soil, and/or water if possible. If burning near highways or populated areas, more extensive mop-up maybe required. In these instances, smoldering stumps, logs, brush, and duff should be extinguished to the greatest degree possible, and as far into the burn as feasible.

(d) The following day, the burn boss will direct personnel to check all burns to ensure they are secure and properly mopped up. If additional resources are needed, the burn boss will coordinate and assign them to the burn area. Smoke signs will be picked up at this time, unless smoke continues to be a problem.

(2) Wildfires

(a) When smoke from a wildfire occurring on the installation is impacting visibility along an installation roadway, the Incident Commander (IC) on the fire will immediately contact the Forestry Branch Chief and the Fort Jackson 911 Center to request DES Law Enforcement assistance with controlling traffic. If the smoke is expected to affect the highway for a long period of time, or into the night, one highly reflective smoke sign will be placed at each end of the smoke corridor approximately ½ mile prior to entering the smoke. The IC will have the wildfires checked again the next morning, and any smoke signs picked up if not needed.

(b) If smoke becomes a problem on a highway off the installation, the IC will immediately coordinate with the Chief of the Forestry Branch and the Fort Jackson 911 Center to contact the South Carolina Highway Patrol for assistance with traffic control. Fort Jackson personnel will assist with traffic control if able, until Law Enforcement arrives on the scene.

Range Operations will then notify the Explosive Ordnance Disposal unit (EOD). If it is unsafe to mark the area, all wildland firefighter personnel should be notified to evacuate the area until EOD has been notified.

(c) Tracers and HE rounds are used on several ranges. These types of munitions will cause fires on these ranges. For this reason, most live fire ranges that use these munitions are prescribed burned annually. If a wildfire starts on a range, and it has not been burned recently, danger to life or property is imminent, or fire weather is extreme, the Forestry Branch in coordination with Range Operations may close the range to suppress the wildfire. If possible, the Forestry Branch will attempt to coordinate with the Range NCOICs and Range Operations to only monitor the fire. This will prevent the range from being shut down, and avoid lost training time for the unit.

(3) Fire Danger Rating

(a) Predicting fire danger and the time it occurs is a valuable tool to a wildland firefighter; but predicting fire danger can often be a difficult process. Many factors are considered when determining fire danger like wind speed, humidity, drought index, days since last rain, and time of year.

(b) During a normal year, high fire danger is usually during the late part of March and extending into the middle of May. If weather patterns change and Fort Jackson experiences a drought, the high fire danger could extend into the summer months. In addition, a late summer/fall drought in September and October could also reach high fire danger levels, due to low fuel moisture, low humidity, and strong cold fronts moving through the area.

(c) SCFC posts a Fire Weather Forecast twice a day (morning and afternoon) with predicted weather parameters as determined by the National Weather Service out of Columbia. The SCFC will also post any red flag alerts if conditions warrant. The Fort Jackson Forestry Branch will use the SCFC forecast along with any local considerations to advise Range Operations of the recommended Forest Fire Danger Rating that units and ranges should follow, (See Appendix E for Forest Fire Danger rating and restrictions).

H. Wildland Fire History

(1) Wildfires have occurred in every month of the year on Fort Jackson since its establishment in 1917. In 1952 the Forestry Branch was established, taking control from the United States Forest Service. Their first priority was to establish an intensive management and protection program. Equipment was procured and personnel trained to set up an efficient forest fire detection and suppression organization. Fire break boundaries were established around the concentrated impact areas of numerous ranges using incendiary ammunition. These high hazard areas were then burned annually. Approximately two years were needed to complete these basic forest fire tasks.

(2) There are no accurate records before the 1950's to show the exact number or location of wildland fires on Fort Jackson. During the last 50 years there was an average of 40 to 50 wildfires a year. Fires average a few acres per fire. There were a few years where over 100

timber operations should be excluded from annual prescribed burn plans, to prevent the necessity of re-marking the timber. Planted areas that are less than 2 years old should not be burned, in order to get the seedlings established. Depending on the time of year and type of application, herbicide areas may have to be removed from the burn plan.

(2) Cultural Resources

Fort Jackson has numerous archeological sites located on the installation. Sites may be located visually by warning signs surrounding the area, and are located on the Fort Jackson Truck Map located in each ENV pickup truck. The use of plowed firebreaks through certain sites of significant cultural value is restricted. Cemeteries located throughout the installation are protected from damage during the application of prescribed fires and the suppression of wildfires.

K. Mission Considerations

(1) Mission Requirements

Fort Jackson is the largest and most active Initial Entry Training Center in the United States Army. The installation also supports National Guard, Navy, Marine Corps and ROTC training throughout the year. There are many military activities such as live-fire exercises ranging from small arms to crew serve weapons, heavy artillery, and demolitions. Frequent prescribed burning facilitates most types of military training, by creating an open forest understory that provides a clear field of view. In addition, live-fire exercises ignite numerous wildfires within the East Impact Area. Under most conditions, these fires can be allowed to burn when a frequent prescribed burning regime is implemented.

(2) Potential Impacts to Installation

Fort Jackson has a long history of wildland fire management. The installation and surrounding communities are accustomed to prescribed burning and the resulting smoke, as well as the common occurrence of wildfires. This IWFMP addresses the wildland fire management goals and techniques used for years, as well as the impacts and potential dangers inherent to wildland fire management. Installation impacts resulting from implementation of the IWFMP should be transparent.

L. Fire Effects Monitoring

Monitoring the affects of fire on the landscape is one of the tools to determine if management and burn prescription goals are being met. A post-burn evaluation will demonstrate how well the stated objectives of the burn were met. This information can also be used to improve future prescriptions (See Appendix F). By using this information, adjustments can be made to prescriptions to improve desired results. This monitoring program will also provide long-term information needed to apply adaptive management to fire dependent communities on the installation. In addition to monitoring the effects, there are 15 photo measurement plots scattered throughout the installation in differing vegetative types where photos are taken at least annually. The manner in which fire is applied to the landscape will change as needed, as the long-term effects of previous fires are documented and analyzed.

- S-200 Initial Attack Incident commander
- S-215 Fire Operation in the Urban Interface
- S-290 Intermediate Wildlife Fire Behavior
- S-390 Introduction to Wildland Fire Behavior Calculations

The Fire Management Officer (FMO) has the responsibility of tracking training requirements and ensuring ENV personnel involved with the wildland fire program are getting the proper training. The FMO will keep a file with copies of certificates and accomplishments on each person that is involved in wildland fire. Additionally, Fort Jackson has no physical fitness requirements for wildland fire personnel involved in fire activities on Fort Jackson. The reasons for this include flat terrain, low altitude, low complexity, readily accessible escape zones, easy fire access and the use of heavy equipment and helicopters for the vast majority of suppression and prescribed burning activities.

3. WILDFIRE

A. Purpose

It is the responsibility of the ENV to reduce the threat of catastrophic wildfires, contain and suppress wildfires that do start, and report wildfire information to the proper Directorates and Agencies. In order to accomplish these functions, it is mandatory that adequate advance planning for both wildfire fire suppression and prescribed burning be accomplished.

B. Notification of Wildfires

The Public Affairs Office (PAO) controls all media releases regarding wildfires. The Forestry Branch will notify the PAO of any significant fire activity that may impact the public. This includes fire or smoke impacting developed areas or highways both on and off post. The PAO may contact the Forestry Branch Chief or IC for information regarding wildfires. The Forestry Branch will notify the U.S. Forest Service South Carolina Coordination Center after all wildfires to report number of wildfires and acres, to ensure that the number of fires and acres are posted nationally.

C. Wildfire Detection

Wildfires are often detected from Fort Jackson's fire lookout tower, but most are reported by aircraft or calls to Range Operations or the 911 system. Fort Jackson staffs one fire tower (as needed), which is Weir Tower located off Wildcat Road next to the Main Tank range. Staffing the fire tower on any given day is weather and fire danger dependent. The FMO will decide when the fire tower will need to be staffed each day, based on current and predicted weather conditions and military training activity. Forestry Branch personnel rotate weekend stand-by duty when warranted. The SCFC no longer operates any of their fire towers due to cost, and solely depends on aerial reconnaissance for fire detection. The SCFC provide some degree of fire detection for Fort Jackson by flying around the perimeter of the installation during their routine flights.

behavior, where protecting the archaeological site endangers life or property, plowing through the archeological sites will be permitted.

(b) Wetlands. Wetlands are sensitive areas to consider when suppressing wildfires. Fire breaks are plowed as shallow as possible and parallel to the contour of the slope when feasible to reduce erosion into the wetland. Wetlands should be allowed to burn whenever possible, to mimic the natural fire mosaic.

(c) Endangered Species. Federally listed endangered species and other rare plants and animals require protection when suppressing wildfires.

- Red-cockaded Woodpecker (RCW). When possible, a fire is completely excluded from an RCW cluster or allowed to burn completely through it to avoid mechanical damage to the trees within the cluster. If safety concerns dictate the need for plowing through the cluster, every effort is made to avoid plowing within 200 feet of a cavity tree. If this is not possible, every effort will be made to not plow under the drip line of a cavity tree (indicated by double white painted bands). This prevents root damage to the tree, and greatly reduces the possibility of tree mortality.

- Endangered Plants. Two Federally listed endangered plant species, Rough-leaved loosestrife and Smooth coneflower, occur on Fort Jackson. Every effort will be made to avoid any endangered plant communities by plowing outside the boundaries of their population.

(3) Wildfire Monitoring

Following a wildfire, the FMO will determine the extent of monitoring due to weather conditions, duff smoldering and/or fuel burning inside the control line. The wildfire is mapped using GPS equipment as soon as possible, and the AFMO will monitor potential problem areas for signs of pine mortality or pine beetle infestations.

4. PRESCRIBED BURNING

A. Purpose

Fort Jackson burns 8,000 to 12,000 acres annually using the latest technologies and science in fire management, such as aerial ignition and growing season burns. Prescribed burning at Fort Jackson refers to scientific application of fire for a specific purpose. Prescribed burning is an accepted forest management practice widely used in the Southeast, and is essential for maintaining the longleaf pine ecosystem, improving habitat for endangered species, enhancing military lands, and reducing the hazard of catastrophic wildfires.

If used carefully and under proper weather conditions, prescribed burning can accomplish several silvicultural objectives: controlling brown spot disease, controlling undesirable hardwood tree species, seed bed preparation, preventing heavy fuel accumulation, and controlling invasive species.

E. Burn Prescriptions

(1) Preparation

A burn prescription should be written prior to burning any area. The FMO or burn boss is responsible for the preparation of the prescriptions using the following publications as primary references: National Wildfire Coordinating Group (NWCG) A Guide for Prescribed Fire in Southern Forests, NWCG Prescribed Fire-Smoke Management Guide, NWCG Aids to Determining Fuel Models for Estimating Fire Behavior, and SCFC Smoke Management Guidelines for Vegetative Debris Burning Operations.

(2) Reconnaissance

Before writing the burn prescription, a forest management history of the burn unit is compiled from existing databases. This data along with the burn history is used to determine potential fuel loading of the burn unit. The next step is to conduct a ground reconnaissance of the burn unit to determine actual fuel loadings. Recommendations are made regarding the season of the burn, and whether ignition should be aerial or by hand. Firing techniques are determined, areas to exclude or be cautious of are noted, and potential to impact smoke sensitive areas are estimated. In addition, wooden structures, port-a-lets, tents, abandoned vehicles, other structures or, items that will need to be protected will be noted.

(3) Smoke Concerns

As far as the general public is concerned, smoke can be a bigger threat to health and public safety than the actual fire. Heavy smoke can impact a large area, affecting homes, hospitals, schools, airports and major highways. It can greatly reduce visibility and cause breathing problems for sensitive people such as children, the elderly, and people with existing lung diseases. Therefore, a smoke screening procedure is used to estimate down-wind and down-drainage smoke impacts for the day of the burn and the following night. Nightly inversions, fog potential, and transport winds are very important factors to consider when determining potential smoke impacts.

(4) Weather Parameters

Daily weather forecasts are obtained from the National Weather Service. These forecasts can be obtained from the Columbia Area Office at their website, or can be obtained by calling their local office at the Columbia Airport (803-822-8133). There are 5 categories for prescribed burning as defined by the SCFC, refer to the chart below. The 5 categories are related to the distance to smoke sensitive areas and the total available fuel measured in tons. No burning is permitted in category 1, irrespective of distance or available tons. If prescribed burning conditions are category 2 or higher, the prescribed burn plan is used to determine if any areas could be burned under those weather parameters. Other weather parameters includes desired wind speed and direction, humidity, fuel moisture content, days since rain, Keetch-Byram Drought Index (KBDI) are written in the burn plan (See Appendix D). Prescriptions should generally be written to follow these parameters. However, the FMO or the Forestry Branch Chief may grant rare exceptions. Sometimes areas can be burned safely using slightly different weather parameters than originally written in the prescription.

(2) Methods

Most preparations will involve grading existing firebreaks and unimproved roads. If interior lines are to be established, a crawler tractor with a fire plow will be used. Hand raking is used for the majority of site preparation work in the interior of the burn blocks. These objects are, but not limited to, the following items: RCW cavity trees, rare plant populations, port-a-lets, cemeteries, power poles, plastic culverts, snags and other buildings and structures. (See Appendix J)

G. Public Burn Notification

Coordination and notification of prescribed burns are made with appropriate officials at Fort Jackson including but not limited to: PAO, Chief of Staff, G3, Garrison Commander, DPTMS and MTC, SCFC, USFS and other interested personnel in the prescribe burn project. A notification letter is sent out by the FMO or Burn Boss by email on the morning of the burn. SCFC, Range Control, and Fort Jackson 911 Center are notified via telephone. USFS is notified at the end of the day with the number of blocks and acres completed.

H. Prescribed Burn Execution

(1) Firing Procedures

Initial firing will be a backing fire ignited from a road or firebreak and allowed to back into the burn area. After a secured control line is established, the remainder of the burn unit can be ignited utilizing various prescribed firing methods. Ignition methods may be adjusted during the operation, depending on fire behavior, weather changes, etc. A fire plow unit will be available on the day of the burn to be used for mop-up, or fire suppression in the event of an escaped fire. If conditions significantly change from the prescription for that unit, the burn could be plowed out (See Appendix C), depending on fire line safety.

(2) Firing Method

Fire ignition is accomplished by personnel with drip torches or power torches mounted on All Terrain Vehicles on the ground. Aerial ignition is accomplished by outfitting a helicopter with a Plastic Sphere Dispenser (PSD) machine. Small spheres containing a mixture of ethylene glycol and potassium permanganate are dropped out of the PSD machine and ignite on the ground following a chemical reaction. The helicopter flies in a grid pattern at a specified speed and spacing, resulting in relatively evenly spaced spot fires on the ground. Aerial ignition burns over the East UXO Impact Area are conducted IAW MOA between the Forestry Branch and Range Control.

(3) Mop-up

Mop-up will begin shortly after the fire has consumed most of the available fuel. Concentrations of heavy smoke will be mopped up to reduce the amount of smoke in the ambient airshed. Before leaving the site, any burning snags near the roads that are considered a threat will be extinguished to the extent practical before leaving.

DEPARTMENT OF THE ARMY
Directorate of Emergency Services
5499 Jackson Boulevard
Fort Jackson, SC 29207

REPLY TO ATTENTION OF

25 September 2008

DIRECTORATE OF EMERGENCY SERVICES
Fire Prevention and Protection Services

Standard Operating Procedure #39
Wildland Firefighting Procedures

1. PURPOSE: To provide safety guidelines for fire protection personnel engaged in wildland firefighting activities on Fort Jackson.

2. GENERAL:

a. The Incident Command System (ICS) is utilized by this department for command and control of resources at all emergency incidents. Most wildland firefighting emergencies will be multi-agency responses involving the Directorate of Emergency Services (DES), Fire Prevention and Protection Division, and the Directorate of Public Works (DPW), Environmental Division. In recognition of this fact, the Incident Commander (IC) for wildland firefighting operations may often be the senior wildland fire official from the Environmental Division. In the event of an urban interface situation where structures or vehicles are involved, the senior structural fire official from the Fire Prevention and Protection Division will perform IC duties. Furthermore, it is recognized that the ICS has provisions for a unified command structure. Dependent upon the magnitude, complexity and nature of the emergency, the above agencies may apply a unified command structure for the incident and thereby share consequence management responsibility for the emergency operations.

b. The primary response apparatus for wildland fire operations will be a brush truck, tanker, and structural pumper (personnel from the pumper will staff the brush truck and tanker). Use of structural pumpers for wildland operations, other than for structural protection, is discouraged and should be done only as a last resort. Range maps will be maintained on all fire apparatus.

c. For safety reasons, no less than two firefighters will be dispatched to wildland fire emergencies - if a full response stated in paragraph 2.b is not required. Personnel will be assigned to direct firefighting tasks in at least groups of two unless performing duties such as water point pump operator, fire watch lookout, shuttle driver for equipment and/or personnel, etc. All personnel will utilize assigned wildland personal protective equipment (PPE) unless circumstances do not allow sufficient time to obtain or if structures/vehicles are involved. They shall be familiar with the 10 Standard Fire Orders, 18 Watch Out Situations, Lookout/Communications/Escape Routes/Safety Zones (LCES) and deploying their fire shelters. Training and familiarization on these items will be conducted annually.

Standard Operating Procedure #39
Wildland Firefighting Procedures

5. All fire department personnel shall review this SOP annually.

BILL FORRESTER
Fire Chief

Encl

Distribution:
Operations Branch
Prevention Branch
911 Center
DPW, Environmental Division
DPTMS, Range Control

D. Reimbursable Work - This shall mean reinforcements exceeding initial attack services furnished by either party, at the request of the other party, or fire protection furnished as a chargeable cooperative fire protection service. Authority is granted to begin reimbursement when initial attack has failed and an overhead team has been requested, or 24 hours after dispatch. Determining the need for an overhead team is strictly the responsibility of the Incident Commander and the assisting agency representatives.

III. Support Provisions:

A. The rendering of assistance under the terms of this agreement shall not be mandatory, but the party receiving the request for assistance should immediately inform the requesting party, if for any reason, assistance cannot be rendered. Any problems that cannot be reconciled between the parties shall promptly be referred through channels to the Fort Jackson Commanding General and South Carolina Forestry Commission State Forester for resolution.

B. Both parties agree to jointly attend an annual coordination meeting and provide an annual operation plan to each other, as an attachment to this agreement. The annual operating plan is a document that will contain, but is not limited to the following items:

1. Maps showing Army installation boundaries and delineating State and Army areas of responsibilities under this agreement.

2. Fire protection organization of each party, including location of fire equipment, and provision of each party to notify the other when significant changes are to be made in the organization.

3. Each party's procedures and responsibilities for:

a. Information exchange including, but not limited to:

(1) Fire reports for joint suppression actions
(2) Fire weather
(3) Fire alerts
(4) Mobilization and dispatch

b. Prevention efforts and provision for coordination of these efforts.

c. Multi-agency training.

4. Signatures of the Fort Jackson Forestry Office Team Leader, Director of Logistics and Engineering, and State Forestry Commission Fire Management Chief.

I. Upon occurrence of a fire inside Army boundaries and threatening State lands, the Army will promptly proceed to take all reasonable action to control and suppress the fire.

J. Upon detection, the Army or State will immediately notify the other cooperator of any fires adjacent to their boundaries.

K. No outside assistance shall be rendered by either the State or Army for suppression action on lands which are the responsibility of the other party without first coordinating such action with the other party.

L. When fire burns across the boundary between jurisdictions, the organization into whose area it burns will become part of the unified command structure and will continue as part of that structure until the incident is secured or is no longer within their jurisdiction. All initial attack or first 24 hours of assistance by personnel and equipment listed for initial attack will be rendered without compensation, no matter how the fire was ignited.

M. Upon arrival at the scene of a fire, assisting personnel and equipment shall report to the Incident Commander or his/her designated representative in the Incident Command system who shall assume full charge of the operations. If the requesting party specifically requests a senior officer of the organization furnishing assistance to assume command, they shall not, by relinquishing command, be relieved of their responsibility for the operation.

N. Annually, prior to the initiation of fire season, the parties shall meet and develop an "Annual Fire Protection Plan", and set up reciprocal initial attack areas for wildfires occurring on lands of intermingled or adjoining protection responsibility. This plan will identify current equipment rental rates and aircraft hourly rates of each party, salary and wage costs of personnel assigned to fire suppression. The plans shall be approved and signed by the designated representatives of both parties and made a part of this agreement as an attachment.

O. The receiving party shall not be required to reimburse the assisting party for its cost when a fire is controlled by initial attack forces.

P. When suppressing wildfires on lands for which the other party is responsible, or when engaged in any training in support of this agreement, each of the parties to this agreement do hereby expressly waive all claims against the other party, and agree to hold harmless and indemnify the other party against any claims for compensation for any loss, damage, personal injury, or death occurring in consequences of the performance of this agreement.

Q. When Army personnel are suppressing wildfires on land for which the State is responsible, the United States shall not be liable to the State or any landowner for any damage in consequence of the performance of work under this agreement.

Appendix C

PRESCRIPTION PARAMETERS

	DORMANT SEASON BURNS	GROWING SEASON BURNS	SITE PREPARATION BURNS
10 HR TLFM	> 7%	> 7%	>7%
TEMP. MIN	33	--------	--------
TEMP. MAX	80	100	100
RH MIN	24	35	20
RH MAX	65	80	80
WINDSPEED -20 FT	3-25	3-20	3-25
KBDI	< 500	<500	<700
FLAME LENGTH	< 8'	< 8'	<10'
SCORCH HEIGHT	< 20'	< 20'	---------
DAYS SINCE LAST RAIN	7-10	7	---------
AMOUNT	.25+	.25+	---------
CATEGORY DAY	≥ 2	≥2	≥2

Appendix E

FOREST FIRE DANGER CHART
FOR FORT JACKSON

FOREST FIRE DANGER RATING	**OPERATIONAL INFORMATION**
CLASS I LOW DANGER	Low threat of fires starting or spreading. IMPACT & RANGES: No restrictions. TRAINING AREAS: No restrictions. EOD & DEMOLITION AREA: No restrictions.
CLASS II MODERATE DANGER	Fires could start, but should be controlled easily. IMPACT & RANGES: No restrictions. TRAINING AREAS: Pyrotechnics are under observation at time of detonation. EOD & DEMOLITION AREA: No restrictions.
CLASS III HIGH DANGER	Fires will start easily and may be difficult to contain. IMPACT & RANGES: No restrictions. TRAINING AREAS: No daytime use of overhead flares. Restricted pyrotechnics to hand emplaced simulators, CS, or smoke grenades. Use simulators, CS, or smoke grenades only in cleared areas (cleared of grass, straw, leaves and humus down to bare soil) of a diameter of 5 meters or more. Simulators will be prohibited if winds become more than 15 mph. A fire watch should be posted for a minimum of 5 minutes. EOD & DEMOLITION AREA: A fire watch should be posted for a minimum of 15 minutes.
CLASS IV VERY HIGH DANGER	Fires will start from a spark discharged by any means, and spread very rapidly. Suppression of fires will be difficult. IMPACT & RANGES: No daytime use of artillery or mortar overhead flares . No other restrictions. TRAINING AREAS: No overhead flares. Pyrotechnics restricted to hand emplaced simulators, CS and smoke grenades. Use simulators, CS, and smoke grenades only in pits* or cleared areas (cleared of grass, straw, leaves and humus down to bare soil) of a diameter of 5 meters or more. Simulators will be prohibited if winds become more than 10 mph. A fire watch should be posted for a minimum of 3 to 5 minutes. EOD & DEMOLITION AREA: An area should be cleared of grass, straw, leaves and humus down to bare soil to a diameter of 10 meters around denotation area. A fire watch should be posted for a minimum of 25 minutes.
CLASS V EXTREME FIRE DANGER	Extreme fire behavior expected. Fires will start from any flash or spark, and suppression efforts may not be effective. IMPACT & RANGES: No Overhead flares of any type. Restricted tracer ammunition to center targets on ranges verified to be "fire proofed" by the Forestry Office. All other ball ammo only. TRAINING AREAS: No pyrotechnics of any type. EOD & DEMOLITION AREA: No demolition permitted. If an EOD emergency detonation is necessary, Forestry Office personnel and/or the Fire Department's tanker will be on standby in a safe zone nearby. A fire watch should be posted for a minimum of 30 minutes after the detonation.

*Pits for simulators should be 2 feet in diameter to a minimum depth of 2 feet. 6 Nov 02

POST-BURN AFFECTS EVALUATION

Training Area:_____

Stands:_____ Burn Type:_____ Acres:_____ Date Burned:_____ Date Evaluated:

PT #	SCORCH		CHAR		BURN SEVERITY		OVERALL BURN VARIABILITY	COMMENTS
	HT	%	HT	DEG	SUBSTRATE	VEGETATION		
AVG'S								

FJ4.4.6LF3

DEPARTMENT OF THE ARMY
Headquarters, United States Army Garrison, Fort Jackson
Fort Jackson, South Carolina 29207-5670

14 February 2012

DIRECTORATE OF PUBLIC WORKS
STANDING OPERATING PROCEDURES
FOR
ENVIRONMENTAL DIVISION
WILDLAND FIRE SUPPRESSION
(INITIAL ATTACK AND FIRE SIZE UP)

1. PURPOSE: To establish uniform procedures to ensure wildland fire suppression activities conducted by Directorate of Public Works (DPW) are performed safely, effectively and timely.

2. POLICY: To ensure an effective communication between wildland fire suppression initial attack personnel, the Incident Commander (IC) and the Fort Jackson 911 Center.

3. REFERENCES:

a. Fort Jackson Integrated Natural Resources Management Plan.

b. National Wildfire Coordinating Group, handbook 410-1, Fireline Handbook.

c. National Wildfire Coordinating Group, S-200, Initial Attack Incident Commander training guide.

d. Integrated Wildland Fire Management Plan (IWFMP).

e. Fort Jackson DPW-Environmental Division Communication Plan.

f. Fort Jackson DPW-Environmental Division Wildland Fire Contingency Plan.

g. Fort Jackson Prescribed Fire Medical and Accident Reporting Plan.

4. RESPONSIBILITIES:

a. DPW, Environmental Division (ENV), Wildland Firefighter trained employees will:

(1) Upon receiving a report of a wildfire on Fort Jackson, and given the assignment to respond to the wildfire, gather essential data about the fire, and safely travel to the wildfire location.

(a) Effective, but prudent use of fire resources requires monitoring of conditions to anticipate hazards and risks, effective communication, good leadership and supervision, and a commitment for personnel safety and welfare.

(b) After the fire is contained, the initial attack force will ensure lines are secure before leaving the scene. This should include walking the lines to ensure a complete fuel break is between the burned and unburned fuels. No unburned fuel will be left in the firebreak and no burning snags will be left near the fireline.

(c) Before leaving the scene, IC will ensure all personnel are out of the burned area, equipment is cleaned and stored back into its right place, and equipment and personnel are ready for initial attack again.

(d) Upon leaving the scene, IC will notify Range Control, 911 Center, and the FMO, or the Forestry Branch Chief (if on duty) that the fire is secure and the attack force is leaving the scene.

(e) The FMO will notify the South Carolina Coordination Center of the number of fires and acres.

(6) Ensure all personnel involved with wildland fire suppression on Fort Jackson are familiar with this SOP by reviewing it annually and signing and dating a roster certifying that they have done so.

5. REVIEW OF SOP: The Directorate of Public Works, Environmental Division, Forestry Branch Chief will review and revise this SOP as necessary, and not less than every three years.

W. Ken Burghardt

W. KEN BURGHARDT
Chief, Environmental Division

17 Feb 2012
(Date)

Appendix I

Fort Jackson Forestry Branch Vehicle Numbers and call signs

BUMPER NUMBER	DESCRIPTION	CALL SIGN
W030318	Chevy 3500 Pumper (200 Gallons)	BT-1
W030828	Ford F350 Pumper (250 Gallons)	BT-2
W030319	Ford 350 Pumper (200 Gallons)	BT-3
30058	JD 450-G Bulldozer	D-1
30059	JD 450-H Bulldozer	D-2
30060	JD 450-J Bulldozer	D-3
30061	D-6M Bulldozer	D-4

Raking Priorities and Specifications

Structures or other items:

Examples include (but are not limited to), deer hunting stands, Kestrel boxes, bat/squirrel boxes, Port-a-Johns, cemeteries, storage boxes, other piled equipment (especially when on pallets), solid pallets, road barriers, lightning sheds, training buildings, tents, wood tent pads, sandbag emplacements (if in good condition, not old, rotting and mostly collapsed), bleachers, stands/tables, weather stations, phone/cable boxes, telephone/power poles (with and without lines attached), wood posts, signs on wood posts, wood signs on metal posts, compass points (large green targets on posts or trees), vehicles/equipment that are mostly intact with intact rubber tires or track/wheel parts: Rake these areas to bare ground at least 3 feet, wider in heavy or flashy fuels. Wooden hunt stands need fuels raked a minimum of 3 feet around that tree. Tents need to be raked at least a minimum of 6 feet. Any straw, or debris located on the tent should be removed, and flaps closed, if possible.

In some areas there are numerous marker posts concentrated around tank turning pads, along arch sites, etc. In general, these posts do not need to be raked (brush truck will stand-by), however, if the fuels are tall and thick around these posts, then they need to be trimmed. You may want to carry a string trimmer with you.

Concertina wire does not need to be raked, however long runs of wire must noted on the map. If prepping on the day of the burn, the FMO will need to be notified.

RCW Cavity Trees, Turpentine Trees and Snags:

Cavity Tree Protection: Protect cavity trees within and in close proximity to the burn unit, following these guidelines:

1. Ensure all members of the burn crew have maps detailing the location and status of all cavity trees. Information distributed to each crew member should include activity status, cavity height, and relative amount of resin present, as determined by surveys performed within one year of the burn date.

2. Protect individual cavity trees by reducing fuels at the base of cavity trees for a minimum distance of 10 ft from the trunk. The necessary distance varies depending on fuel types, fuel loads, amount of resin present, cavity heights, and firing techniques. Restoration burns require a greater distance of fuel reduction than less intense maintenance burns. Use maximum distance during the nesting season and when protecting cavity trees with turpentine scars and resin low on the bole of the tree. If using aerial ignition, remove fuels for a distance of at least 20 feet from the cavity trees.

3. Use one or more of the following methods of cavity tree protection:

a. Small preparation burns. Conduct preparation burns of the cluster prior to conducting the larger burn. This can be performed immediately before or several weeks ahead of the larger burn.

b. Raking. Rake fuels far enough from the trunk to prevent cavity tree ignition. Avoid the formation of mounds or rings of concentrated fuels (such as pine straw); such piles of

Composite Risk Management Worksheet

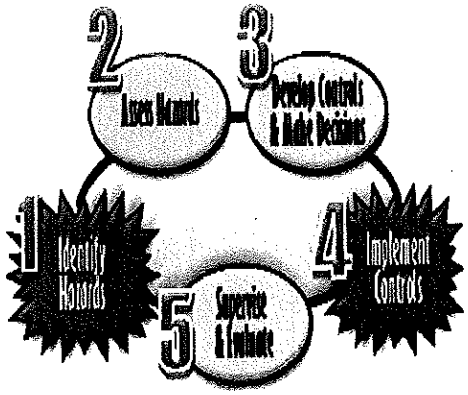
For use of this form, see FM 5-19, Composite Risk Management

Mission/Task: Prescribed Burning and Wildfire Control in the East Impact Area(EIA)	DTG Begin: 17 Feb 12	DTG End: 16 Feb 13	Date Prepared: 31 Jan 12	
Prepared by	Name: Sara Clayborne Rank: GS-9 Position: FMO, Forestry Branch, DPW-ENV	Number Soldiers: Number Cadre:	BMNT: EENT: Illum%:	High Temp: Low Temp: Precip%:

RISK ASSESSMENT MATRIX

Severity		Probability				
		Frequent A	Likely B	Occasional C	Seldom D	Unlikely E
Catastrophic	I	E	E	H	H	M
Critical	II	E	H	H	M	L
Marginal	III	H	M	M	L	L
Negligible	IV	M	L	L	L	L

E – Extremely High H – High M – Moderate L – Low



Overall risk level after controls are implemented

☐ Low ☒ Moderate ☐ High ☐ Extremely High

I have read and understand this risk assessment. I understand my responsibilty to ensure all participants understand the hazards and control measures associated with this activity and are in compliance with the risk assessment:

Officer in Charge: John Maitland Rank: GS-12 Date: 14 FEB 12

Signature: _____

Range Safety Officer: John Wood Rank: GS-11 Date: 15 Feb 12

Signature: _____

Risk Decision Authority

Name: W. Ken Burghardt Position: Chief, Environmental Div, DPW

Signature: W. Ken Burghardt Date: 23Feb12

Name:

Signature: _____ Date:

Name: Position:

Signature: _____ Date:

Space for specific hazard entries is provided on FJSO Form 7566-A; Composite Risk Management Continuation Sheet

FJSO Form 7566, April 2010

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			6. Reduce personnel time spent within EIA.		6. Use aerial ignition to the greatest possible extent.	6. IC/FMO will ensure is burned annually with a helicopter, if available.	
			7. Personnel will work in pairs as is practical, and maintain radio communication.		7. Personnel will not work alone, as is practical, or when radio communication is not available.	7. IC/FMO will ensure all personnel working in the EIA have radio communication, and work in pairs, when possible.	
	Wildland Fire related injuries (burns, smoke inhalation, equipment related injury)	M	1. All personnel will be trained as basic wildland firefighters.	L	1. The FMO will maintain training records for all employee involved with prescribe burning.	1. Supervisors will ensure personnel receive appropriate training, as required for the employee's position or role.	
			2. Personnel will follow the JHA for prescribe burning and wildfire suppression.		2. Supervisor will ensure all personnel are provided the JHA for both prescribe burning and wildfire suppression and appropriate wildland fire PPE.	2. IC/FMO will ensure all participants are familiar with JHA for prescribe burning and wildfire suppression, and are wearing appropriate PPE.	
			3. Personnel will be briefed on operations and maintain radio communications.		3. IC/FMO will brief personnel on operational plans, identify and brief safety hazards, radio channel(s) to be used.	3. Supervisor will ensure IC/FMO is conducting briefing, and ensure employees are issued functioning radios.	
			4. Personnel will safely operate equipment and maintain equipment in safe working condition.		4. Personnel must successfully complete required training and testing in order to operate equipment. Personnel will inspect and repair equipment prior to its use.	4. AFMO will inspect and ensure equipment is operating properly.	
			5. Personnel will report changes in weather and/or fire behavior to IC.		5. IC/FMO will ensure all personnel are briefed prior to conducting the prescribe burn on the fire weather forecast.	5. When in the office, the supervisor will report changes in the weather conditions to IC/FMO via radio.	
			6. Safely operate an ATV from the roads, to assist with ignition.		6. Provide personnel operating the ATV a copy of the ATV JHA.	6. IC/FMO will ensure that personnel are familiar with JHA for operating an ATV.	

Composite Risk Management Worksheet

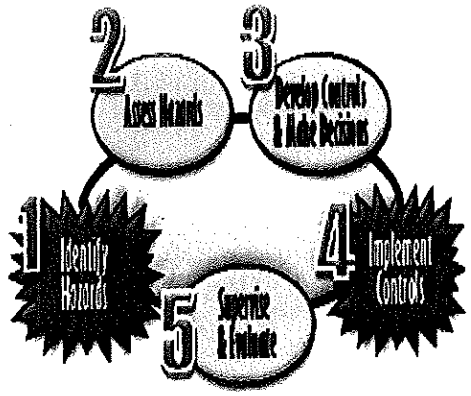
For use of this form, see FM 5-19, Composite Risk Management

Mission/Task: Aerial ignition for prescribed burning.	DTG Begin: 17 Feb 12	DTG End: 16 Feb 13	Date Prepared: 23 Jan 11	
Prepared by	Name: Sara Clayborne Rank: GS-09 Position: FMO Branch, DPW-ENV	Number Soldiers: Number Cadre:	BMNT: EENT: Illum%:	High Temp: Low Temp: Precip%:

RISK ASSESSMENT MATRIX

Severity		Probability: Frequent A	Likely B	Occasional C	Seldom D	Unlikely E
Catastrophic	I	E	E	H	H	M
Critical	II	E	H	H	M	L
Marginal	III	H	M	M	L	L
Negligible	IV	M	L	L	L	L

E – Extremely High H – High M – Moderate L – Low



Overall risk level after controls are implemented

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Officer in Charge: John Maitland Rank: GS-12 Date: 14 FEB 12

Signature: John Maitland

Range Safety Officer: John Wood Rank: GS-11 Date: 15 FEB 12

Signature: John Wood

Risk Decision Authority

Name: W. Ken Burghardt Position: Chief, Environmental Div, DPW

Signature: W. Ken Burghardt Date: 23Feb12

Name: Position:

Signature: _____ Date:

Name: Position:

Signature: _____ Date:

Space for specific hazard entries is provided on FJSO Form 7566-A; Composite Risk Management Continuation Sheet

FJSO Form 7566, April 2010

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Igniting line from helicopter	Spot over from misguided drops	M	Both air and ground crews must be vigilant in watching where the aerial ignition spheres land to prevent spot over.	L	Ground crews must wear appropriate PPE (hard hat, gloves, nomex clothing and boots) to be prepared to extinguish spot over .	Incident Commander (IC) on ground will ensure everyone is wearing proper PPE.	
Operation of PREMO MK III Aerial Ignition System (AIS)	Malfunction/fire explosion, injury	M	Pre-operational inspection of PREMO MK III AIS.	L	Ensure AIS machine has pre-operational documented inspection before usage.	Fort Jackson personnel will ensure pre-operational inspection of AIS equipment has been carried out.	
			Only trained certified personnel operate AIS equipment with required PPE.		Ensure only trained personnel are used as operators of AIS equipment.	Fort Jackson will ensure qualified personnel operate AIS equipment and that all required PPE is worn.	
Helicopter crash	Burning fuel, possible explosions. Falling limbs and debris from trees.	H	Pilot will be properly trained in aerial ignition methods. Pilot will ensure helicopter is properly maintained and in good working order.	M	Pilot will complete all required maintenance logs.	Fort Jackson personnel will ensure that all helicopter maintenance logs are completed.	

OUT OF PRESCRIPTION: Once the prescribed fire no longer falls within the prescription the following will occur:

- Ignition will be suspended immediately.
- All personnel will assist in holding and mop-up.
- If necessary, the Burn Boss will have a dozer plow a containment line to suppress the fire or the section of the burn unit may be burned out depending on size of section remaining to be burned and weather conditions.
- Weather measurements will be taken as needed to determine when parameters are in prescription.
- The Burn Boss/IC may commence firing once all prescription items are within parameters established by the burn plan.

SMOKE (PRESCRIBED BURN): Once a smoke intrusion into a smoke sensitive area (SSA) has occurred the following will take place.

- Ignition will be suspended immediately.
- All firing personnel will become lookouts, or assist in traffic control.
- Smoke signs will be posted, if not already posted on site.
- Personnel will remain in SSA with red lights flashing, one in each direction, if available, until a State Trooper arrives.
- If necessary, notify the Fort Jackson 911 Center, Chief of Environmental Division, and the South Carolina Department of Public Safety of intrusion to alert State authorities if needed.
- If necessary, the burn boss will have a dozer plow a containment line to suppress the fire.
- Begin aggressive mop-up to alleviate intrusion.
- Continue mop-up and patrols until smoke no longer poses a threat to the public.
- If weather parameters become favorable, ignition may continue.

SMOKE (WILDFIRE): Once a smoke intrusion onto a paved road has occurred, the following will take place:

- An appropriate number of personnel not directly involved in suppression efforts will become lookouts or assist in traffic control.
- Smoke signs will be posted.
- Personnel will remain in SSA with red lights flashing, one in each direction, if available, until a State Trooper arrives.
- Notify Fort Jackson 911 Center.
    - If road is located off-post, have 911 Center contact the South Carolina Department of Public Safety.
    - If road is located on-post, have the 911 Center contact the Military Police.
- Once the wildfire has been contained, aggressive mop-up will begin to alleviate intrusion.

Mop-up and patrols will continue until smoke no longer poses a threat to public.

- Keep all communications as brief and concise as possible, break frequently to allow for emergency traffic.
- All communications should be in "clear text". This includes radio, briefings, and all command functions. (Acronyms, 10-codes and abbreviations should not be used.)
- Be courteous and use proper radio etiquette.
- Remain calm when talking on the radio to ensure information is heard and understood correctly.
- Speak clearly and ensure you are speaking into the microphone, located in the upper left hand corner of the radio.
- In addition, be aware of the following when using the scan feature. The last scanned talk group will remain active for approximately 6 seconds. If you try to transmit in this 6 second window, you will be transmitting on that talk group. To ensure you traffic is being received by the proper recipient, view the screen of your radio to see what talk group is active before transmitting.
- If an emergency occurs and medical treatment is necessary, notify Fort Jackson 911 Center Talk Group (Z1, talk group 3 - FIRE DISP). Refer to the Medical Emergency Plan. Batteries have a limited life. If the battery begins "chirping" before an 8 hour work shift is over, the battery needs to be replaced. Replacement batteries are located in the large battery charger across from the administrative assistant desk.

2. Aircraft

Contract aircraft flying over the installation must contact Range Control when entering and exiting the installation. Primary frequency is 130.00 VHF and the backup is 32.90 FM.

3. Communication Limitations

a. Limited Coverage. The trunking radio system does have some limited coverage areas or "dead spots". In particular, the area around Training Area (TA) 19A and 19B, Omaha Beach, Messers Pond and areas east of Colonels Creek Road experience communication problems. If working in these areas as a group, using Z1 Talk Group 7 (FIRE DIR1) will ensure best communication. Before changing to this talk group, ensure the recipient is also on the talk group as they will not be able to receive your radio communication once you change to FIRE DIR1. Also be aware that coverage between radios on FIRDIR1 is limited to about a quarter mile radius.

b. Aerial Burning. Currently, personnel working in the helicopter cannot communicate via the trunking system because the aircraft radios cannot be programmed for the trunking frequencies in the 400 MHz range. The present solution is for the person sitting in the front seat next to the pilot, communicate with the burn boss/IC on the ground by utilizing Z1 Talk Group 1 (ENRD) on their handheld trunked radio.

4. Radio Capabilities

There are two repeaters on Fort Jackson. One is located at Weir Tower, and the other being on top of Moncrief Army Hospital. Most cantonment traffic will be sent though Moncrief, while most traffic outside the cantonment will be through the repeater located at Weir Tower.

If the repeater at Weir Tower is not functioning, some traffic from outside the cantonment area will not be sent, this depends upon your location. In addition, if the repeater at Moncrief is

FORT JACKSON PRESCRIBED FIRE, AND WILDFIRE SUPPRESSION MEDICAL AND ACCIDENT REPORTING PLAN

This action plan is designed to set specific direction for assigned employees to follow when an accident occurs. The plan covers both field operations and office dispatching. This action plan also assumes that every project will have a Job Hazard Analysis (JHA) completed prior to work activity. Employees should review the JHA for their project and contact their supervisor for further clarification or acquiring their own personal copy.

I. Action Plan: Sequence of Procedures.

A. **Field Person** will:

Inform burn boss/Incident Commander(IC) of injury. Ignition may be suspended depending on the situation.

B. **Burn Boss/IC** will:

1. Ensure appropriate first aid is administered to injured employee.
2. If additional medical treatment is needed beyond basic first aid, the burn boss/IC will contact Fort Jackson 911 Center with the following information:
   a. Specific location of accident victim(s) (road name or firebreak number).
   b. Accident severity (personal injuries) - emergency or minor.
   c. Avoid giving name of individual(s).
   d. Size up the situation and make recommendation for necessary action (will go directly to a local Hospital, need ambulance, need wrecker, etc).
3. Notify Fort Jackson Range Control by radio or at 751-7171.
4. Notify Environmental Division by radio or at 751-5011.
5. Notify the Safety Office at 751-6004/2541.

C. **Fort Jackson 911 Center** will:

1. Dispatch Fire Department and Moncrief Army Community Hospital EMS assets.
2. Maintain radio communication - notify appropriate level of command by telephone.
3. Maintain communication log of conversation.

D. **Environmental Division Staff (Chief or Office Automation/Secretary)** will:

1. Monitor and provide assistance when needed.
2. Provide guidance or instruction to field personnel, if needed.
3. Ensure injured employee will be brought to office prior to receiving medical attention, if possible.
4. Based on accident severity, notify the necessary people (Division Chief, Branch Chief, family members, etc.).
5. Send appropriate form to medical facility.
6. Complete CA-1 Form for government employee.

IWFMP ANNUAL PLAN REVIEW

The table below summarizes comments received by the ENV Forestry Branch for the current revision of the plan.

Reviewed By	Organization	Date Reviewed	Remarks

IMFMP PLAN UPDATE & REVISION

Revisions reflect significant changes to the plan. Revisions can include format changes or changes due to significant revisions of policies, operations and/or regulations. A revised plan must be submitted for review by organizations responsible for wildland fire and prescribed burning and signed off by the Garrison Commander. An update reflects minor changes that are not a result of operational and/or regulatory changes or significant changes to the plan's format. An update does not require review by any organization other than ENV. This plan shall be reviewed annually and revised at least every five (5) years.

Reviewed By	Organization	Date Reviewed	Remarks

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APPENDIX 6

DEPARTMENT OF THE ARMY
Headquarters, United States Army Training Center and Fort Jackson
Fort Jackson, South Carolina 29207

31 October 2014

DIRECTORATE OF PUBLIC WORKS (DPW)

STANDING OPERATING PROCEDURES

SILVICULTURAL MANAGEMENT CONTROL

FORESTRY BRANCH

ENVIRONMENTAL DIVISION (ENV)

1. **PURPOSE**: To provide an outline for the functions and duties of the personnel involved with the management of the Forestry Branch silviculture program. This SOP is designed to assure quality control and compliance at each step of the silvicultural management process. The process includes the following steps; timber inventory, timber stand prescription, timber marking, timber harvesting, and pine straw harvesting. This SOP will be reviewed at least once a year by Forestry Branch personnel, or revised as needed.

2. **REFERENCES**:

a. AR 200-3 Natural Resources - Land, Forest and Wildlife Management

b. Fort Jackson Integrated Natural Resources Management Plan, Forest Management Section

c. EM 385-1-1 Corps of Engineers Safety Manual

d. Technical/Agency Draft Revised Recovery Plan for the RCW

3. **ORGANIZATION**: The management of the silviculture program falls directly under the Forestry Branch, ENV. Other division personnel, military trainers, and U.S. Army Corps of Engineers, Savannah District (Corps) may also provide input.

4. **FUNCTIONS**:

a. Collecting Forest Inventory Data - Appendix 1

b. Timber Stand Prescriptions - Appendix 2

c. Timber Marking - Appendix 3

d. Timber Harvest - Appendix 4

e. Color of Ribbon and Paint to Use with Each Operation – Appendix 5

f. Forest Stand Types – Appendix 6

g. Species Code List – Appendix 7

APPENDIX 1
COLLECTING FOREST INVENTORY DATA

PURPOSE: To ensure that Fort Jackson has a reliable forest inventory, to provide criteria for collecting inventory data, and to guarantee that all users have a high confidence in the procedures for collecting data.

FUNCTION: The Forestry Branch is responsible for the installation's forest inventory program and ensuring the quality of that data.

SCHEDULE: The forest inventory was completed at the end of FY11, and will not be updated for at least 10 years, or when funding and personnel become available. Compartments 11 and 12 will be inventoried using surrogate data once every ten years. Compartment 13 and portions of Compartments 11 and 12 that are under forest management will be inventoried with adjacent compartments. Stands that were marked with the leave tree method will not be re-cruised after harvest. Stands that were marked with the take tree method, or harvested using the operator select method, will be re-cruised within 12 months after timber harvesting has been completed.

I. PROCEDURES FOR COLLECTING FOREST INVENTORY DATA

1. Maps:

a. Forestry technicians will ensure they have an electronic map (developed using SilvAssist™ and ArcGIS™) with the following information on each map: stand number, acres, points, point numbers, spacing between points, and metal contamination if any.

b. The stand map must be verified by a forester before the stand is inventoried.

2. Points:

Number of points per stand: Use the Toolbar in ArcGIS to determine the number of plots. Please refer to the SilvAssist™ User's Manual for detailed steps. In most cases, the plot locations from the original forest inventory cruise will be used instead of creating new plots.

3. T-Cruise™ Data Management:

Please refer to the SilvAssist™ User's Manual for detailed steps.

NOTE: All T-Cruise™ operations described below can be referenced in Figure 1-2.

a. Template – import template file which holds current Fort Jackson species codes (usethisone.tct).

b. Tract Info - enter the acreage, date, stand number/name, cruiser name, training area location, and owner (Fort Jackson).

c. Current Params – change default species code to dominant species of particular forest stand in order to simplify data collection.

d. Adding a Point - establish stratum (stand number), point ID (point number), and cruiser name (your initials).

Figure 1-1: T-Cruise™ Data

Template – *File → Import Params File → usethisone.tct*
Tract Info – *Edit → Tract Info*
Current Params – *Edit → Current Params*
Adding a Point - +

4. Data Fields:

a. Point Numbering - The number of points will be predetermined for each stand using the toolbar in ArcGIS. An automatic grid spacing will be used to distribute these points evenly throughout the stand (see Figure 1-1). Points will be taken where they fall, except on roads, etc. When points fall on the edge of a road, firebreak, etc. or on the edge of another stand (when the entire plot does not lie within the stand), the mirage method may be implemented, or the plot may be moved away from the edge minimal distance to mitigate the obstacle prior to cruising using ArcGis. The mirage method is as follows:

1.) Establish the plot exactly where the plot center falls and measure and record all trees falling in the plot that are inside the stand.

2.) Pace the distance from the plot center to the stand edge along the same bearing used to establish the plot.

3.) Continue on the same bearing and pace the same distance from the stand edge into the area outside the stand.

4.) From this point, establish a plot and measure and record all trees falling in this plot that are inside the stand as part of the original plot (Some trees may be tallied twice).

b. Tree Numbering – Measure and record trees consecutively from north in a clockwise manner. Use a 10-factor prism to determine which live trees are in the plot. Only these trees should be tallied in the electronic data recorder. Mark the starting point with flagging.

c. Species - Determine the correct tree species and use the appropriate code from the species codes sheet (see Appendix 7).

d. DBH - Enter diameter using the two-inch diameter class chart below:

Figure 1-2: 2 Inch Diameter Class Limits

2" = 2.0" - 3.5"
4" = 3.6" - 5.5"
6" = 5.6" - 7.5"
8" = 7.6" - 9.5"
10" = 9.6" - 11.5"
12" = 11.6" - 13.5"
14" = 13.6" - 15.5"
16" = 15.6" - 17.5" etc.*

* - NOTE - Only trees which are to be used as a site index (SI) trees will be measured to the nearest tenth inch, e.g., 12.4. All measurements will be taken at breast height (4.5 feet) to the nearest tenth inch using a diameter tape. For trees that are on a slope, always measure on the uphill side.

e. Quality – Based on the size and form of a tree, it will fall under one of the following quality types; cull, pulpwood, chip & saw (CNS), sawtimber, or pole (see Table 1-3). A cull is a tree which does not meet the minimum diameter or height for pine or hardwood pulpwood specifications. A pole is a tree that is 10” or larger, almost perfectly straight and symetrical, and does not contain any defects.

f. Merchantable Height - A clinometer or similar device will be used to measure merchantable height (see Table 1-3). The merchantable height of only the first pulpwood tree tallied of each species will be recorded, and the merchantable heights for C-N-S and sawtimber will be recorded for every tree tallied. Pulpwood trees will be measured in 5 foot increments and must contain a minimum of 20 feet. CNS and pole trees will be measured in 8 foot half log increments and must contain a minimum of 1.5 logs (24 feet). Sawtimber trees will be measured in 8 foot half log increments and must contain at least one contiguous 16 foot log. Cull trees will not be measured for height.

Table 1-2: Minimum Merchantable Diameter Limits

Pulpwood				**CNS and Pole**		**Sawtimber**			
Pine		*Hardwood*		*Pine*		*Pine*		*Hardwood*	
DBH	Top	DBH	Top	DBH	Top	DBH	Top	DBH	Top
5.0”	3.0”	8.0”	4.0”	10-12”	6.0”	14.0”	8.0”	12.0”	10.0”

NOTE 1: All diameters are measured diameter outside bark (DOB).

NOTE 2: Stands that are designated as metal contaminated, will not be cruised with any CNS, or sawtimber trees. However, if there are pine trees of pole, or piling quality, they will be tallied as poles.

g. Total Height - All Site Index (SI) trees will be measured to the top of the tree to the nearest foot using a clinometer or similar device.

h. Age – On those stands requiring a Site Index (SI), a tree will be taken from all odd number plots. Starting with the first plot, then every other plot thereafter (i.e., plots 1, 3, 5, 7 etc.). The SI tree should be a healthy pine tree with good form either a dominant, or codominant tree, and the dominant species for the stand (or by plot if not known), and the size class that occurs the most for the stand (or by plot if not known). An increment borer will be used to determine age. Six years will be added to longleaf pine and three years to all other pine species to establish total age. Hardwood trees will not be bored, even if the stand is predominantly typed as a hardwood stand.

> NOTE: The first plot will have one tree cored when an age is provided with the stand. If that age is within 5 years of the age provided, then no further plots will be aged. If the age is not within 5 years, then the procedure mentioned above will be implemented.

i. Growth – When growth is required, growth will be measured by counting the last 10 years of tree rings and measuring the length to the nearest tenth inch (this procedure excludes the outer cambium layer and bark).

j. Remarks – Note any remarks pertaining to unique information about the point and surrounding area (i.e., 4 dead pines, plot landed in an old logging deck, plot landed adjacent to stand boundary, etc.). Notify a forester of any changes needed to the stand boundary that may need to be changed.

NOTE: A forester will decide when a stand requires growth measurements.

5. Data Management:

a. A forester will select the stands that need to be inventoried. He/she will provide any knowledge of the stand to the person cruising.

b. The technician that maintains the Forest Inventory Database (FID) will add the stand number to the spreadsheet that contains the priority list of stands to be inventoried. He/she will generate a new list when the previous list has been completed, or upon request. The list will include the stand number, acreage, aging criteria, metal contamination (known, suspect, or none), and training area number.

c. The list will be given to a forester, who will return it within 14 days once the data has been verified.

d. The list will then be forwarded to the technician in charge of collecting the forest inventory (FI). The FI technician will select stands to be inventoried from the list provided by the forester.

e. The next step is to create the electronic cruise maps for each stand (see section I.1).

g. The raw point data will then be forwarded to a forester, who will review and approve the point data. Field checks will be performed by the forester as necessary. Point data will not be changed without field verification (See section II below for data accuracy criteria requirements). The forester will notify the FI technician, if he/she will perform a field check.

h. As needed, the FID and FI technicians will compare data to ensure all stands have been completed based on the inventory list.

II. LEVELS OF ACCURACY FOR THE FOREST INVENTORY

Random field checks will be performed to verify the work of each timber cruiser as needed. If there is a problem occurring with a timber cruiser, a more intensive field check will be done. The field checks will be performed by a forester to ensure quality assurance. During field checks, the forester will use his/her diameter tape, clinometer, and prism to measure questionable trees. All borderline trees will have their limiting distance verified.

At least 10% of the points for each stand will be checked from the stands selected for field checking. One of these selected points will contain a site index tree.

1. <u>The timber cruiser must meet the following standards based on the systematic check described above</u>:

a. Per Point

1.) Tally Tree
- a.) May not incorrectly identify more than one pine species.
- b.) May not incorrectly identify more than two hardwoods species.
- c.) May not miss more than one tree DBH.
- d.) May not miss more than one tree (either in or out) with a prism or by using limiting distance per two points checked.
- e.) May not miss more than two heights of pulpwood trees by +/- 10 ft.
- f.) May not miss more than two heights of sawtimber trees by +/- 1/2 log

2.) Site Index Tree
- a.) May not miss more than one tree DBH (+/- 0.1 inch) per stand.
- b.) May not miss more than one total tree height (+/- 5 feet) per stand.
- c.) May not miss more than one tree age (+/- 5 years) per stand.

b. Per Stand

1.) May not miss any points per cruise.
2.) May not miss more than one dead tree tallied as a live tree (trees that are dying and tallied as alive should be noted on the electronic data sheet – see section I.4.j).
3.) May not miss any errors made when completing general information (see section I.3.b).
4.) May not miss any plots taken outside the stand boundaries.

2. <u>Failing any of the following standards constitutes a re-cruise of the stand</u>:

a. More than one pine incorrectly identified per point checked.

b. More than one missed tree using a prism or limiting distance per every two points checked.

c. More than one missed DBH per point checked.

d. More than one dead pine identified as a live tree per stand.

e. More than one point is taken in a road, firebreak, tank trails, etc. that is identified on the map.

NOTE: No points will be taken in roads or firebreaks that can be identified from the map. If roads, firebreaks, etc. are discovered on the map or on the ground, and are not in GIS map layers, they are to be reported to a forester. A forester will determine if the road will, or will not be added. Any road or firebreak that is added to the GIS layer will be recorded with a GPS unit.

f. More than one point taken outside of the stand boundary.

3. Failing any of the following standards constitutes a partial re-cruise and requires the following corrective actions:

a. Site Index Trees

1.) If more than one age is missed (+/- 5 years), then all site index trees must be re-aged for the stand.

2.) If more than one height is missed (+/- 5 feet of total height), then all site index tree heights must be re-measured for the stand.

3.) If more than one DBH is missed (+/- 0.1 inch), then all site index tree DBHs must be re-measured for the stand.

4.) If more than one species is misidentified, then all site index trees must be re-checked for species.

APPENDIX 2

TIMBER STAND PRESCRIPTIONS

PURPOSE: To ensure consistent, reliable, long term forest management practices in compliance with endangered species conservation that enables the Forestry Branch to meet Fort Jackson's mission requirements. To provide standards for collecting, using and disseminating timber stand prescription data.

FUNCTION: The Forestry Branch is responsible for gathering silvicultural prescription data necessary for writing timber stand prescriptions, up-dating forest inventory database, and for up-dating GIS forest stand layers. Any stand prescription data determined to be not representative of the stand will be collected less intensively than forest inventory data, because the prescription will be written based on stand inventory data plus some additional plots taken during the Forester's field visit. Previous forest inventory data will only be used if the data is less than ten years old, and is considered to be accurate. If the forest inventory data is greater than ten years old, or the stand data is considered to be inaccurate, then the stand will be re-inventoried using the "Collecting Forest Inventory Data " SOP (see Appendix 1). This combined stand data will be submitted for the REC process and used to update the GIS Geo-database.

SCHEDULE: An annual timber harvest plan will direct the forester as to when and where the prescriptions will be performed. This plan may be amended at anytime as conditions warrant.

GOALS:

1. Thinning - The goal of the thinning program is to enhance the health and vigor of pine stands by maintaining the stands basal area (BA) at between 40 to 70 pine BA, and thinning between 250 and 500 acres annually. Hardwood inclusions of greater than 1/2 acre will be conserved outside of RCW clusters. RCW clusters and recruitment sites will be maintained at between 40 to 70 BA with a goal of no more than 10 BA of quality upland hardwood. This will provide an realistic military training environment and quality RCW forage habitat.

2. Restoration - The goal of the restoration program is to provide: realistic training areas, quality RCW habitat, a restoration of the longleaf ecosystem, an adequate age class distribution, and a healthy forest ecosystem.

NOTE: This will be accomplished by converting most slash, and poor quality loblolly pine stands that are off-site, and stands that have less than 30 BA of suitable pine to longleaf pine. Sites that have an appropriate pine species with an evenly

distributed seed source greater than 30 BA will also be released.

I. PLANNING

1. Forest Inventory - The forest inventory database, in conjunction with local knowledge, will be used to identify potential stands that may require some type of silvicultural practice, such as thinning, restoration, fuel chipping or release.

2. Limiting Factors - The following information will also be considered when determining potential locations for silvicultural work to be performed:

a. Military Training Considerations
   1.) Current Military Training Sites
   2.) Current Firing Points
   3.) Permanent Ranges
   4.) Permanent Training Sites (NBC Course, etc)

b. Endangered Species Locations
   1.) Active RCW Clusters
   2.) RCW Recruitment Sites
   3.) Inactive RCW Clusters
   4.) Endangered Plants

c. Other Environmental Considerations
   1.) Solid Waste Management Units (SWMU)
   2.) Archaeological sites

d. Metal Contamination and Unexploded Ordnance Considerations
   1.) Known/Suspected Unexploded Ordnance (OFF LIMITS)
   2.) Known Metal Contamination
      - Shrapnel
      - Steel Jacketed
      - Lead
   3.) Suspected Metal Contamination
      - Location and Direction of Fire of Abandoned Ranges
      - Type of Munitions Fired from the Range
      - Approximate Date Range was Abandoned

e. Previous Silvicultural Operation and Date of Operation
   1.) Seedtree
   2.) Shelterwood
   3.) Thinning
   4.) Clearcut
   5.) Fuel Chipping

II. COLLECTING PRESCRIPTION DATA

The forest data will be collected using the method described in Appendix 1, Section I "Procedures for Collecting Forest Inventory Data".

III. TIMBER STAND PRESCRIPTION SUMMARY FORMS

Timber Stand Prescription Summary Forms are used to provide specific stand information (per acre) that pertains to the treatment of a particular stand.

1. Thinning Prescription Summary Sheet - The thinning prescription summary sheet is used to provide specific stand data about a stand which requires some type of thinning operation. This form can be completed using the SilvAssist™ Toolbar located in ArcGIS™.

2. Reforestation Prescription Summary Sheet - The reforestation prescription summary sheet is used to provide specific stand data about areas scheduled for some type of reforestation operation: removal of off-site pine species, planting, herbiciding, and/or release.

3. Stand Review - If any questions arise, the forester and wildlife biologist will visit stands proposed for thinning, or reforestation to discuss prescription prior to the submission of the REC.

IV. RECORD OF ENVIRONMENTAL CONSIDERATION

1. REC Submission - The next step of the prescription process involves the submission of a REC (Record of Environmental Consideration), FJ Form ATZJ-DPW-200-1. The appropriate stand prescription form and location map will accompany the REC. A location map will include adjacent labeled roads and firebreaks as well as other suitable reference points. The REC and all attachments will be submitted electronically to the NEPA Coordinator.

2. Timber Marking Prescription Summary Form - Once the REC has been approved, the next step in the process is to complete a timber marking prescription summary form. The timber marking prescription summary form will consider the procedures outlined in the timber marking SOP (see Appendix 3).

APPENDIX 3

STANDARD OPERATING PROCEDURE FOR TIMBER MARKING

I. PLANNING

1. General Timber Marking Guidelines - Pine stands will be thinned using the following guidelines. These requirements will follow the approved RCW Endangered Species Management Component (ESMC), unless otherwise noted in the timber marking prescription:

a. Residual Basal Area - Thin stand to a 40-70 pine BA in all pine stands.

b. Species Priority - Select healthy longleaf pine, if not available then shortleaf pine as leave trees over all other pine species.

c. Quality - Pine trees selected as leave trees will be healthy, high quality trees. In addition, select healthy, high quality upland hardwoods. Leave Oak, Hickory, and Cherry over 8" DBH, and Persimmon, Dogwood, Crabapple, and Black Walnut over 4" DBH in addition to the pine trees. (unless otherwise noted)

d. Form - Consideration will be given to tree vigor, crown ratio, form class, and any disease that may be affecting the tree. All healthy trees that match the definition of a relict tree will be marked as a leave tree.

> NOTE: A relict tree is defined as a very old (greater than 100 years in age) pine tree that expresses characteristics such as a flat top and slick bark.

e. Marking Stumps - All marked trees will have one stump mark that is painted 1/3 to 1/2 of the way around the tree and slightly below ground level.

f. Boundary Trees - Boundary trees will be painted with three slashes at a height of 5.5 to 6.5 feet and one stump mark. The stump mark will face into the proposed harvest area.

g. Paint Bands - Stands with marked leave trees will have a 2 to 3-inch band painted around the tree at a height of 5.5 to 6.5 feet.

2. Specific Timber Marking Guidelines:

a. Reforestation - The purpose of reforestation is to retain all healthy longleaf pine except for trees that have crowns which are touching. These trees will be thinned

using the crown tree method.

b. Thinning - The purpose of thinning is to favor healthy, longleaf pine trees over all other species. Longleaf pine trees are marked as leave trees during this process.

NOTE: A healthy pine is defined as a tree that contains less than 30% cronartium, and the main stem does not fork above DBH, and the crown of the tree is not thinning.

c. Discretion - Trees selected by the timber markering (TM) forestry technician are considered to be the “timber marker’s choice”. Any single tree choice will not be challenged, as long as the selection was made while following established guidelines.

II. TIMBER MARKING PROCESS

1. Stands with Marked Take Trees:

a. Product designation - Stands with marked take trees will have a product designation painted on each tree:

1.) Pulpwood and sawtimber will be painted using 1 paint slash on 1 side of the tree.

2.) Poles will be designated by 3 paint slashes on 2 sides of the tree.

NOTE: All painted marks will face the proposed logging decks as designated by the forester.

b. Cruising Marked Timber - Once the stand has been marked, the stand will be cruised using the same number of plots as used in the original forest inventory, unless more are deemed necessary. Marked timber will be tallied as leave or take tree by species, product designation, diameter, and height. The resulting data will be used to develop timber sale volumes, and post-thin data in the forest inventory database.

2. Stands with Marked Leave Trees:

a. Proper Tree Spacing Selection - cruise lines through each stand selected for leave tree marking will sample prevailing DBH of acceptable dominant and co-dominant leave trees.

1.) Select the nearest dominant or co-dominant tree at each sample point that is acceptable as a leave tree and record its DBH (to the nearest inch).

2.) Summarize by one-inch DBH classes to determine the estimated DBH of leave trees. Subtract one DBH class after determination of the average DBH.

3.) Refer to Table 1 (“Spacing by Average Leave Tree DBH for Southern Pines.”) to determine the appropriate leave tree spacing.

b. Tree Selection Marking - Leave trees will be selected on a grid basis (see Figure 1) determined by the appropriate leave tree spacing (see Table 1).

> NOTE: For example, a stand is to be thinned on 21 x 21-foot spacing; creating a grid square of 21-feet square per leave tree. A spot of paint will be placed on the ground to mark the center of the 21-foot square. The best potential leave tree will be selected in the square. The selected tree can be anywhere in the square. However, if two or more dominant or co-dominant trees are equally acceptable, select the tree closest to the center point. Once the tree has been marked, the timber marker must return to the center point and pace 21 feet in the selected direction to the next grid square center. The procedure is then repeated for each grid square.

3. Sale Volume Determination - Once the stand has been cruised, the resulting data will be used to develop timber sale volumes and post-thin volumes in the forest inventory database.

a. Data Management - Data collected from the leave tree cruise will replace the data currently in the GIS databases, once the timber sale is complete. Data collected from the take tree cruise will be used to ensure the stand was marked according to the timber marking prescription. (see Appendix 2, section IV.2).

b. Volume Completion - The stand will be considered complete when the following information is submitted to the forester:

1.) A an appropriate sized scale map that includes all sale blocks, roads and firebreaks, and all areas that are off limits to logging.

2.) Summary sheets with volume for pine and hardwood (Scribner log rule), pine basal area, and number of pine stems. These figures will be developed by stand, and 2" diameter classes.

III. TIMBER MARKING INSPECTIONS

1. Periodic Field Inspection - The Forester will periodically verify the has been marked according to the timber marking presciption.

2. Final Field Inspection – The Forester, and the TM forestry technician(s) will make

a field inspection of the stand after the completion of the timber marking prescription.

a. Sufficient spot checks will be completed to ensure the timber stand is marked according to the timber marking prescription.

b. The stand will be re-marked and re-cruised, if it does not meet the timber marking prescription, following the final field inspection.

1.) The forester may complete field checks (points) to verify the stand is being marked according to prescription.

2.) If there are any problems at any stage in a re-mark, and/or re-cruise, it will be the responsibility of the forester to resolve these issues.

c. If any major changes are made to the prescription, it will be re-submitted through the REC process (see Appendix 2, section IV). However, if no major changes are made to the prescription, timber marking will commence immediately.

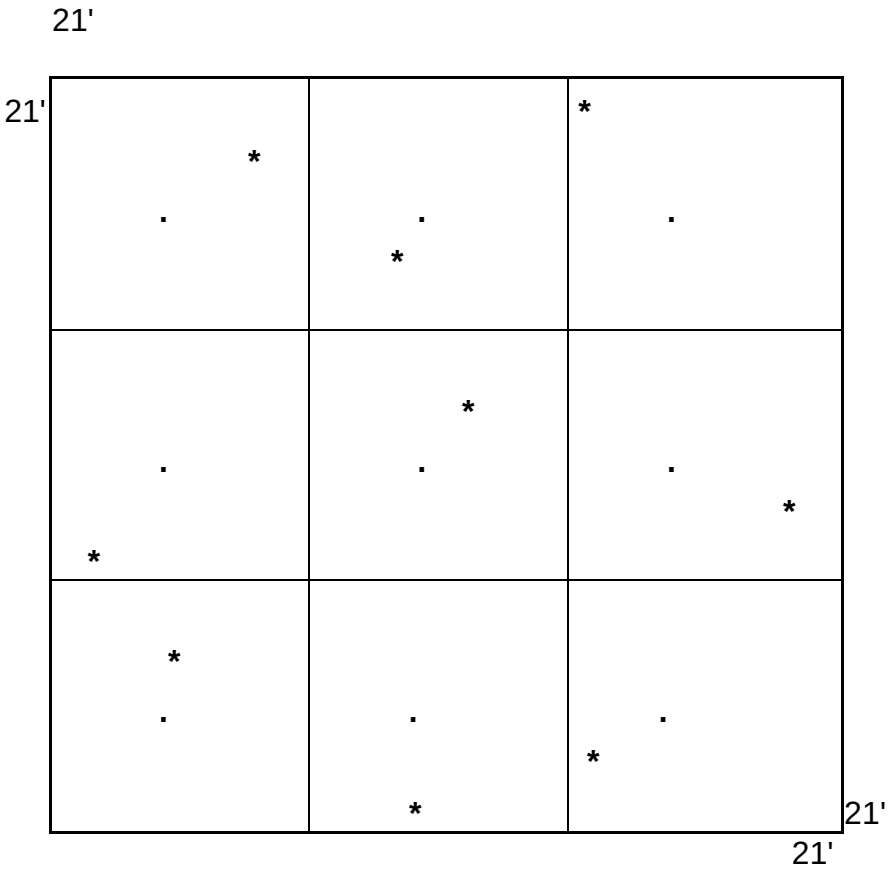
NOTE: All comments, changes, or corrections noted will be incorporated into the final version of the timber marking prescription.

Table 1:
Spacing by Average Leave Tree DBH for Southern Pines

AVERAGE DBH	GRID IN FEET	NO. TREES/ACRE	BA/ACRE
6	12 x 12	303	58
	11 x 11	357	70
	10 x 10	438	86
7	14 x 14	224	60
	13 x 13	258	69
	12 x 12	302	81
8	16 x 16	169	59
	15 x 15	194	67
	14 x 14	223	78
	13 x 13	258	90
9	18 x 18	133	59
	17 x 17	151	67
	16 x 16	170	76
	15 x 15	194	86
10	20 x 20	108	59
	19 x 19	122	67
	18 x 18	135	74
	17 x 17	151	83
11	22 x 22	91	60
	21 x 21	99	66
	20 x 20	109	73
	19 x 19	121	80
	18 x 18	134	89
12	24 x 24	76	60
	23 x 23	82	66
	22 x 22	90	71
	21 x 21	98	78
	20 x 20	109	87
13	26 x 26	65	60
	25 x 25	70	65
	24 x 24	76	70
	23 x 23	82	76
	22 x 22	90	83
	21 x 21	99	91

14	28 x 28	56	60
	27 x 27	60	65
	26 x 26	64	69
	25 x 25	70	75
	24 x 24	76	82
	23 x 23	82	88
15	33 x 33	41	50
	31 x 31	45	56
	28 x 28	56	69
	26 x 26	64	79
	24 x 24	74	93
16	35 x 35	36	50
	33 x 33	40	57
	31 x 31	45	63
	29 x 29	52	73
	27 x 27	60	85
17	37 x 37	32	50
	35 x 35	36	58
	33 x 33	40	65
	31 x 31	45	73
	29 x 29	52	83
18	39 x 39	29	52
	37 x 37	32	58
	35 x 35	36	65
	33 x 33	40	73
	31 x 31	45	83
19	42 x 42	25	50
	40 x 40	27	55
	38 x 38	30	61
	36 x 36	34	68
	35 x 35	36	71
	34 x 34	38	75
	32 x 32	43	85
20	43 x 43	24	53
	41 x 41	26	57
	39 x 39	29	63
	37 x 37	32	71
	35 x 35	36	79
	33 x 33	40	89

Figure 1:
Leave Tree Spacing Diagram



APPENDIX 4

STANDARD OPERATING PROCEDURE FOR TIMBER HARVESTING

I. GOALS

1. Purpose - It is the direct responsibility of the US Army Corps of Engineers to oversee the sale and harvest of forest products (including timber harvest) on Fort Jackson (FJ). The FJ forester or his representative will be responsible for making at least weekly checks on the logging contractor, and reporting any problems to the Corps COTR.

2. Responsibility - In instances where there will be a direct negative impact to endangered species, archeological sites, or if the contractor is in imminent danger, the FJ forester will notify the contractor to stop timber harvesting operations immediately.

3. Actions - Only in the above mentioned instances will harvesting operations be halted by FJ personnel. Once harvesting operations has been halted, the FJ forester will then notify the Corps immediately, as well as all pertinent installation activities. The FJ forester will also notify the Chief of the Forestry Branch, and the appropriate program manager from the Wildlife Branch. If problems with the contractor do not involve the aforementioned instances, the Corps will be notified by the forester of such problems with corrective action being taken promptly by the Corps. As the Corps no longer maintains an office at Fort Jackson, the Corps may direct the FJ Forestry Branch to take corrective actions in their absence until the Corps can schedule time for a field visit to FJ.

APPENDIX 5

COLOR OF RIBBON AND PAINT TO USE WITH EACH OPERATION

Although the following is a list of recommended colors of paint and ribbon for each forestry operation, these are not restrictions. Rather, they are intended to be a guide. There are exceptions that will require the use of a different color of ribbon or paint, depending on the situation.

Ribbon Color

BLUE - Timber Thinnings

ORANGE - Reforestation & Herbicide

PINK – Inventory & Fuel Chipping

WHITE - Contaminated Trees

Paint Color

BLUE - Leave trees and boundary for thinning.

RED - Leave trees in reforestation treatment areas, and boundaries for reforestation, and herbicide treatment areas, and take trees in timber thinnings and salvage areas.

YELLOW - Boundaries for treatment area where poles are to be marked, and marking the take trees in areas that contain poles.

ORANGE - Boundaries and take trees that are not applicable to the aforementioned situations or conflict with aforementioned situations.

APPENDIX 6

FOREST STAND TYPES

TYPE

NP - Pine with at least 80% pine basal area (BA)

PH - 50 - 79% pine BA with at a minimum of 30 pine BA, and MSO is not the dominant hardwood type

PSO - Greater than 30% pine BA, but less than 80% pine basal area, and at least 30 pine BA, and MSO is the dominant hardwood type

HP - 20 - 49% pine BA, and MSO is not the dominant hardwood type

SO - Less than 30 pine BA, and MSO is the dominant hardwood type

UH - Less than 20% pine BA, and dominant hardwood types are any of the following hardwood types: DOG, NRO, SWO, HIC, SRO, MRO, BEE, BLC, BLW, MWO, POO, SCO, WHO

BH - Less than 20% pine BA, and dominant hardwood types are any of the following hardwood types: BLG, REM, YEP, SWG, CYP

APPENDIX 7

SPECIES CODES FOR FORT JACKSON

CODE	SPECIES
ASH	ASH
AWC	AT WHITE CEDAR
BEE	BEECH
BLC	BLACK CHERRY
BLG	BLACK GUM
	-BLACK TUPELO
BLL	BLACK LOCUST
BLW	BLACK WALNUT
COT	COTTONWOOD
CYP	CYPRESS (BALD)
DOG	DOGWOOD
ELM	ELM
ERC	EASTERN REDCEDAR
HAC	HACKBERRY
HIC	HICKORY
	-MOCKERNUT
	-PIGNUT
	-SHAGBARK
	-SAND
HOL	HOLLY
LOP	LOBLOLLY PINE
MAG	MAGNOLIA
MRO	MISC. RED OAK
	-BLACK OAK
	-NORTHERN RED OAK
MSO	MISC. SCRUB OAK
	-BLACKJACK OAK
	-BLUEJACK OAK
	-TURKEY OAK
	-SAND POST OAK
MUL	MULBERRY
MWO	MISC. WHITE OAKS
	-SWAMP CHESTNUT OAK
	-CHESTNUT OAK
MYP	MISC. YELLOW PINES
	-POND PINE
PEC	PECAN
PER	PERSIMMON
	-SOURWOOD
POO	POST OAK
REM	RED MAPLE
RIB	RIVER BIRCH
SAS	SASSAFRAS
SCO	SCARLET OAK
SHP	SHORTLEAF PINE
SLP	SLASH PINE
SRO	SOUTHERN RED OAK
SWB	SWEETBAY
SWG	SWEETGUM
SWO	SWAMP WHITE OAK
SYC	SYCAMORE
WAO	WATER OAK
	-LIVE OAK
	-WILLOW OAK
WHO	WHITE OAK
WHP	EASTERN WHITE PINE
WIE	WINGED ELM
YEP	YELLOW POPLAR
ZLP	LONGLEAF PINE
ZSO	SHUMARD OAK
MSC	MISCELLANEOUS
	-BLACK WILLOW
	-SOUTHERN CATALPA

APPENDIX 7

INRMP Benefits for Endangered Species

Critical Habitat is defined in the Endangered Species Act (ESA) as "specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection". An area can only be established as "Critical Habitat" after the USFWS has published it in the Federal Register. The ESA also states that "the secretary shall not designate as critical habitat any lands or other geographic areas owned or controlled by the Department of Defense, or designated for its use, that are subject to an INRMP prepared under section 101 of the Sikes Act, if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation."

Fort Jackson has no area that is considered critical habitat. Fort Jackson will manage its lands with an ecosystem approach, and in accordance with the 2003 Red-cockaded Woodpecker recovery Plan, the 2007 Army Management Guidelines for RCWs, and the endangered species management components of this INRMP.

APPENDIX 8

INTEGRATED PEST MANAGEMENT PLAN

For

Fort Jackson, S.C.

2012

(SEE ATTACHED)

TABLE OF CONTENTS

APPENDICES

I. INTRODUCTION.

A. Purpose. This Integrated Pest Management Plan (IPMP) is the framework through which the pest management program is defined and accomplished on Fort Jackson. The plan identifies elements of the program to include health and environmental safety, pest identification, pest management, as well as pesticide storage, transportation, use, and disposal. This plan is to be used as a tool to reduce the reliance on pesticide usage, to enhance environmental protection, and to maximize the use of integrated pest management (IPM) techniques.

B. Authority.

1. Department of Defense (DOD) Instruction 4150.7, DOD Pest Management Program, 29 May 1996.

2. Army Regulation (AR) 200-5, Pest Management, 13 Dec 2007

C. Program Objective. This plan provides guidance and requirements for operating and maintaining an effective pest management program. IPM principles are stressed in the plan. Adherence to the plan will help maintain compliance with pertinent laws and regulations. The IPM strategies found in Appendix A will be maximized in order to comply with pesticide reduction on the installation IAW DODI 4150.07, DOD Pest Management Measures of Merit (MOM) #2.

D. Integrated Pest Management (IPM). IPM is the judicious use of both chemical and non-chemical control techniques to prevent pests from exceeding an acceptable population level or damage threshold. Emphasis is placed on minimizing environmental disruption that is caused by sole reliance on pesticide applications. IPM depends on surveillance to establish the need for control and to monitor the effectiveness of management efforts. Appendix A provides minimum preventive and corrective threshold limits for the application of pesticides.

1. IPM Principles. The four basic principles described below are the heart of IPM and are descriptive of the philosophy used on Fort Jackson to manage pests. Specific IPM methods can be found in the IPM Outlines in Appendix A. Additional methods can be found in Armed Forces Pest Management Board, Technical Information Memorandum No. 29, "Integrated Pest Management in and around buildings". While any one of these methods may solve a specific pest problem, often several methods are used concurrently, particularly if long-term control is the goal.

a. Mechanical/Physical Control. This method involves the use of barriers, devices or manual labor to control pests. Examples of this type of control include: caulking or filling voids to eliminate harborage, mechanical traps or glue boards, installation of screens or other barriers to prevent pest entry into buildings, the application of heat or cold, hoeing to control weeds, and the manual removal

of pests by vacuum or by hand. Many pest problems encountered on Fort Jackson can be prevented or solved by using mechanical control techniques.

b. Cultural Control. Strategies in this method involve manipulating environmental conditions to suppress or eliminate pests. Examples of cultural control include: crop rotation, water management, destruction of alternate host plants, sanitation, altering irrigation times. Elimination of food and water for pests through good sanitary practices is the most important cultural control method employed under this plan. General cleanliness in buildings, dining facilities, break rooms, storage areas, etc., may prevent pest populations from becoming established or from increasing in size.

c. Biological Control. This control strategy uses predators, parasites, or disease organisms to control pest populations. In some cases sterile adult insects may be released into the breeding population to lower reproductivity. Biological control may be effective in and of itself, but is often used in conjunction with other types of control. This type of control is by nature very pest specific, environmentally sensitive and may not be practical or available for a given pest problem. Pesticide formulations of bacteria are readily available biological control agents for management of caterpillars on plants and immature mosquitoes in aquatic breeding sites.

d. Chemical Control. Chemical Control is the reduction of pest populations or prevention of pest injury by using materials (pesticides) to poison them, attract them to other devices or repel them from specific areas. The use of pesticides (insecticides, herbicides, fungicides and rodenticides) is often the most simple and effective method of control available. However, pest resistance has reduced the effectiveness of many once commonly used compounds. In recent years, the trend has been to use pesticides that are pest or site specific with little or only limited residual activity. In general, pesticides should be used only after other methods of control have been attempted or considered. Chemical control is most effective when used in combination with other methods such as mechanical or cultural controls.

2. IPM Outlines. IPM Outlines for pest surveillance and control are found in Appendix A. Each major pest or category of pests is addressed in separate outlines. New outlines are to be added to Appendix A if additional pests at specific sites are encountered which require surveillance and/or control. Added outlines or changes in pesticide usage will be sent to the Army Environmental Commander (AEC) Pest Management Consultant (PMC) for review and approval. Appendix B provides required information for approval request of new pesticides to be included in the IPM programs. CAUTION: These outlines do not identify all the precautions and directions identified on product pesticide labels. Pesticide applicators must be familiar with and follow all precautions and directions on the pesticide label of the pesticide being used. **The label is the law!**

E. <u>Plan Maintenance</u>. The Fort Jackson Installation Pest Management Coordinator (IPMC) maintains this plan. Pen and ink changes are made to the plan throughout the fiscal year. It is reviewed and updated annually to reflect all the changes made in the pest management program during the fiscal year. Annually by 1 October, updates of this plan will be sent to the AEC PMC for professional review and concurrence.

II. RESPONSIBILITIES.

A. Installation Commander.

1. Approve, implement and support the Fort Jackson IPMP, (DOD Pest Management MOM #1).

2. Designate on orders an Installation Pest Management Coordinator (IPMC) for all Fort Jackson pest management activities.

3. Support the DOD Pest Management MOM #2 to maintain at the same level or less than the amount of pesticides (pounds of active ingredients average) applied on the installation during 2002 and 2003 (averaged).

4. Ensure that all personnel performing pest management duties receive appropriate training and achieve required pest management certification (DOD Pest Management MOM #3) (Appendix C).

5. Ensure that all pest management operations are conducted safely and have minimal impact on the environment.

6. Ensure that adequate funds and staffing are provided and committed to support installation pest management program requirements.

7. Ensure records of pest management operations are maintained IAW current Army guidelines.

B. Directorate of Public Works.

1. Environmental Division

a. Monitor all environmental aspects of Fort Jackson's pest management programs.

b. Determine Fort Jackson's position and responsibilities in community-wide pest management regarding quarantine and epidemics.

c. Ensure the IPMC is fully trained and DOD certified in the appropriate Environmental Protection Agency (EPA) categories in accordance with the pest management needs of the installation.

d. Incorporate the IPMP in the installation's Natural Resources Plan.

e. Obtain and maintain adequate supplies of pesticides and pesticide dispersal equipment, and ensure that the pesticide storage and handling facility is adequate and properly maintained.

f. Provide necessary coordination with the installation safety and medical authorities to ensure appropriate personal protective equipment is worn and medical surveillance of government employed pest management personnel is conducted.

g. Complete any necessary environmental documentation needed to support the implementation of the IPMP.

h. Supervise and direct pest management operations of the Wildlife and Forestry Branches.

i. Obtain and maintain adequate supplies of pesticides and pesticide dispersal equipment, and ensure that pesticide storage and handling facilities are adequate and properly maintained at the Wildlife and Forestry Pesticide Shop, Building 2558.

j. Ensure that Wildlife and Forestry personnel who perform pest control services receive adequate training, and achieve the required Pest Management Certification. Additionally, ensure pesticide applicators receive Hazard Communication; First Responder (Level 1); and Hazardous Waste Handler/Supervisor training.

k. Maintain required daily records of Wildlife and Forestry pest management operations on a Pest Management Maintenance Record, DD Form 1532-1. Monthly, report all pest management operations on a DD Form 1532, Pest Management Report, to the IPMC.

m. Provide the IPMC a quarterly inventory of all pesticides stored at the Wildlife and Forestry Pesticide Shop, Building 2558.

2. Installation Pest Management Coordinator (IPMC).

a. Determine the pest management requirements for the installation.

b. Annually, by 1 October, update this pest management plan and submit it to the AEC PMC for review and approval (DOD Pest Management MOM #1).

c. Coordinate pest management activities between the installation and higher headquarters.

d. Perform collection and analysis of pest control records for all pesticide applications or services performed on the installation.

(1) Screen records for completeness and accuracy.

(2) Maintain copies of all the installation's pest control service records.

(3) Compile the yearly Pesticide Usage Report for Southeast Region Office (SERO) Installation Management Agency (IMA) and other statistical reports as required, (DOD Pest Management MOM #2).

e. Monitor pest control contracts on the installations and recommend modifications as needs arise. Review all proposed pest control contracts on the installation prior to forwarding them to the AEC PMC for review and approval.

f. Monitor certification (all) and training (government staff) requirements for pesticide applicators and other personnel providing pest management support, such as pest surveillance and pest management contract oversight, (DOD Pest Management MOM #3.) Appendix C provides a listing of pest management personnel, their certifications numbers, categories of pest control certified to perform, and certification expiration dates.

g. Maintain information resources of the following:

(1) Pest Control Contracts; copies of each contract, the list of pesticides and methods approved for use, the product labels and MSDS's, the applicator names and certification documents, and appropriate contractor's pesticide business license(s) of pesticide applicator(s).

(2) Pesticide inventories maintained in the installation's pesticide storage facilities (Bldgs 2558 and 3664).

(3) Copy of pesticide label and its corresponding MSDS for all pesticides and other hazardous materials used in the installation's pest management program. Appendix D, Pesticide Usage Proposal, lists all pesticides included in this IPMP (Appendix A).

(4) Reference collection of publications related to pesticides, entomology, and pest management; and pest control/pesticide laws and regulations (Appendix E).

(5) Current records of all certified pesticide applicators and South Carolina Pesticide Business License for each company engaged in applying pesticides (Appendix C).

h. When required, Aerial Spray Statement of Need (ASSON) (i.e., for emergency or other services), which are not addressed in the installation pest management plan.

i. Comply with and notify the AEC PMC of additional documentation, coordination, and project approval requirements when the installation participates in regional or other aerial application projects sponsored by non-DOD governmental agencies.

j. Answer inquires concerning pest management from the installation commander, other installation officials, SERO IMA, and DA.

k. Identify and address findings of adverse occupational health and safety reports in annual updates to the installation pest management plan.

l. Coordinate with local and State (Appendix F), and Federal agencies (Appendix G), as necessary, to conduct the installation's pest management program.

m. Notify the AEC PMC of all proposed visits and findings by representatives of non-DA governmental agencies when such visits and findings involve pesticide storage and handling, pest quarantine, environmental, or health and safety issues associated with pesticides or pest management.

n. Maintain records of pesticide disposal in accordance with Federal, DoD, and Army procedures.

o. Coordinate and monitor the procurements of pest control services using Government Purchase Card (GPC) (Appendix H).

C. Director of Family and Morale, Welfare and Recreation.

1. Supervise and direct Fort Jackson Golf Club pest management operations.

2. Obtain and maintain adequate supplies of pesticides and pesticide dispersal equipment, and ensure that pesticide storage and handling facilities are adequate and properly maintained at the Fort Jackson Golf Club.

3. Ensure that Fort Jackson Golf Club personnel performing pest control receive adequate training, and achieve the required Pest Management Certification. Additionally, ensure pesticide applicators receive Hazard Communication; First Responder (Level 1); and Hazardous Waste Handler/Supervisor training.

4. Maintain required records of golf course pest management operations on a daily Pest Management Maintenance Record, DD Form 1532-1. Monthly, report all pest management operations on a DD Form 1532, Pest Management Report, to the IPMC.

5. Provide the IPMC a quarterly inventory of all pesticides stored at the Fort Jackson Golf Club.

D. Preventive Medicine Service, US Army Medical Activity. (External organizations such as, but not restricted to, the South Carolina Department of Health, Clemson University Cooperative Extension Service, and the U.S. Army Center for Health Promotion and Preventive Medicine-South at Fort McPherson, GA may be called upon for assistance.)

1. Conduct surveillance for mosquitoes, ticks, cockroaches and other pests, which could adversely affect the health and welfare of the Fort Jackson Community. Coordinate surveillance results (positive or negative) with the IPMC immediately upon completion of the pest survey for appropriate action. Monthly, report to the IPMC all pest surveillance activities on a DD Form 1532, Pest Management Report.

2. Coordinate with local health officials to determine the prevalence of disease vectors and other public health pests in the area surrounding the installation (Appendix F).

3. Evaluate and monitor the health aspects of the pest management program.

4. Modify threshold limits for the application of pesticides, as necessary, to control medically important pests and to meet the needs of Fort Jackson (Appendix A).

5. Monitor the ventilation systems of pesticide storage/mixing buildings.

6. Perform medical surveillance of government employees whose duties require the application of pesticides.

7. Annually by 1 October, report the pest management certification status (certification categories and expiration dates) of Environmental Health Section personnel to the IPMC. Ensure personnel who conduct pest surveillance and make pest management recommendations have and maintain appropriate DOD Pest Management Certifications (Appendix C). This is to meet Measures of Merit requirements.

8. Provide pest identification support to installation personnel involved with pest management. Submit specimens, such as stored products pests, for identification to the US Army Center for Health Promotion and Preventive Medicine–South (USACHPPM-South), as necessary.

E. Veterinary Services, Fort Jackson.

1. Conduct surveillance for pests, which destroy or contaminate food, stored in installation facilities.

2. Provide advice to pet owners concerning pests, which may adversely affect the health of their animals.

3. Participate in the final disposition of vertebrate animals captured or collected on Fort Jackson to include appropriate actions for submitting specimens for disease analysis.

4. Monthly, report all pest surveillance activities on a DD Form 1532, Pest Management Report, to the IPMC.

5. Support the West Nile virus surveillance program by managing surveillance of dead birds.

F. Tenant Units and Installation Personnel.

1. Apply good sanitation practices to prevent pest infestations.

2. Apply only those pesticides approved for use by building occupants, as outlined in the Fort Jackson U-Do-It program (Appendix I).

3. Use all nonchemical and chemical pest control techniques available through the U-Do-It program to the fullest extent before requesting further assistance from the Pest Management Contractor.

4. Cooperate fully with pest management personnel in scheduling pest management operations to include preparing the areas to be treated.

5. Do not contract for pest control services without written authorization from the IPMC.

6. General –use pesticides (e.g; purchased from AAFES) may be used in and around family quarters. Do not use non-general use pesticides to common areas; application of these pesticides (insecticides, herbicides or rodenticides) may only be accomplished by certified applicators.

G. Unit Commanders/ Officer-In-Charge.

1. Soldiers involved in field training, such as IET soldiers, must use the DOD repellent system to protect them from mosquitoes, ticks and other biting insects. (see Appendix J)

2. AR 40-5 requires each company, troop, or battery size unit to appoint a field sanitation team. Ensure that field sanitation teams (FST) are trained and properly equipped IAW FORSCOM Reg 700-2 and fully mission capable prior to deployment (FM 21-10-1). A list of FST materials is provided in Appendix K. Application of pesticides available to the FST, other than insect repellents, will not be permitted on Fort Jackson.

3. Do not permit non-certified pesticide applicators (soldiers) to apply pesticides (including herbicides) to unit areas. Coordinate all pest management requirements with the IPMC. Do not contract for pest control services without IPMC approval.

H. Pest Management Personnel.

1. Meet all training and certification requirements of the DOD Plan for the Certification of Pesticide Applicators. This applies to all personnel engaged in pest management operations. South Carolina pesticide applicator certification is required for all contract personnel engaged in pesticide application on Fort Jackson property. Non-certified personnel are prohibited from applying pesticide on the installation. Additionally, any contractor engaged in applying pesticides shall have a South Carolina Pesticide Business License in appropriate categories of pest control for the work being performed. Categories of pest control certification include:

DOD	South Carolina	Description
2	2	Forest Pest Control
3	3	Ornamental and Turf Pest Control
5	5	Aquatic Pest Control
6	6	Right-of-Way Pest Control
7	7	Industrial, Institutional, Structural and Health-Related Pest Control
8	8	Public Health Pest Control

2. Use IPM techniques to the maximum extent possible. Select control strategies and pesticides that assist the installation in meeting the 50% pesticide usage reduction goal (DOD Pest Management MOM #2).

3. Control pests according to the provisions of this plan (Appendix A). Do not apply pesticides in a routine, scheduled or preventive manner, unless specified in this plan. Base pesticide applications upon current surveillance results and when pest populations exceed established minimum threshold limits for chemical control (Appendix A), unless historical data supports the need for a preventive pesticide application.

4. Operate in a manner that minimizes risk of contamination to the environment and personnel.

5. Apply only those pesticides specified in this plan (Appendices A and D). Ensure that superiors are kept informed of changes in pest management requirements. Submit a Pesticide Approval Request (Appendix B) to the IPMC to request AEC PMC approval to modify any listed pesticide or control strategy.

6. Obtain and maintain supplies of pesticides in a manner that minimizes the need to dispose of excess/unserviceable pesticides. Ensure all pesticide application equipment is properly maintained and calibrated in accordance with the manufacturer's directions.

7. Maintain effective liaison with installation health and environmental officials.

8. Wear appropriate personal protective equipment during pest management operations.

9. Provide written records of pest surveillance and control efforts to the IPMC. See Appendix N, Pest Management Record Keeping, for the information required.

10. Store pesticides only in approved pesticide storage facility. The only buildings approved for pesticide storage are Building 2558, Wildlife and Forestry Pesticide Shop and Building 3664, Fort Jackson Golf Club. Mix (or formulate) pesticides at either Building 2558 or 3664.

I. Quality Assurance Evaluators (QAE) of Pest Management Contracts.

1. Obtain training in accordance with DOD Instructions 4150.07 and AR 200-1 in the appropriate pest categories, unless a DOD certified pesticide applicator is available to assist the QAE.

2. Evaluate contract pest management operations to ensure contract specifications (Appendix M, Contract Performance Work Statement) and the quality standards (Appendix A) are met.

3. Evaluate the functions/tasks of contract pest controllers while in progress to determine if effective pest management is being obtained.

4. Inform the Contracting Officer's Representative (COR) and IPMC about: specifications that require modification or improvement; any discrepancies in contractor performance; and any action by the contractor that may jeopardize health, safety, or the environment.

5. Provide the IPMC records of all pest management quality assurance work monthly or as otherwise required by the IPMC.

6. Monitor type, concentration, and method of application of pesticides used by contractor.

J. Directorate of Contracting: Contracting Officers' Representative (COR) for Pest Management Contracts.

1. Oversee contract pest management operations to ensure contract specifications are met.

2. Ensure that pest management contract specifications are based upon specific IPM procedures detailed in this plan (Appendix A).

3. Modify pest management contract specifications (in coordination with the IPMC and QAE) if they do not incorporate the latest, most effective and or least toxic IPM methodologies. Submit contract modifications related to pest management to the AEC PMC for review and approval.

III. PRIORITY OF PEST MANAGEMENT. Priorities of pest control operations will be in the order shown below:

A. <u>Disease Vectors and Public Health Pests</u>. These are insects or other animals that are capable of transmitting organisms that cause disease, or which may themselves cause injury to people or their animals.

2. Mosquitoes

a. Mosquitoes occur in large numbers at Fort Jackson from March to October. Mosquitoes not only reduce personnel efficiency due to the annoyance of their biting but also may serve as the source for diseases such as various types of encephalitis. Special emphasis is necessary for the threat of West Nile virus found in this area of South Carolina.

b. Mosquito breeding sites (e.g. artificial containers, small temporary pools of water, wetland areas) are located on Fort Jackson as well as the surrounding adjacent properties. Mosquito control mainly consists of fogging, adult resting site treatments, larvacide applications, and personal protection (e.g. repellents).

2. Ticks may transmit disease organisms on Fort Jackson. Tick-borne diseases include: Lyme disease, Rocky Mountain spotted fever, human ehrlichiosis, tularemia and Southern tick associated rash illness (STARI). Rocky Mountain spotted fever is the most important tick-borne disease that occurs in South Carolina. Tick paralysis can occur from bites but its occurrence is rare.

3. Spiders

a. Brown recluse spiders are rarely found in South Carolina. The spiders are generally active at night. During the day they rest in undisturbed, dark, sheltered areas such as under rocks, woodpiles and bark. They are frequently found in corners and crevices of buildings. The brown recluse normally bites when pressure is applied to it. Painful bites can cause restlessness and fevers. The healing of bites may take several weeks to months. Because many illnesses are often misdiagnosed as “spider bites”, spider control should be based upon surveillance with capture and identification of spider specimen.

b. Black widow spiders are known to occur in South Carolina and frequent undisturbed places in warehouses, storage areas, fixed firing positions, and range and recreational structures. These spiders may produce painful bites as well as toxic reactions that can become severe.

c. The yellow sac spider is a common spider in South Carolina and can produce a bite similar to the brown recluse spider.

4. Fire ants are common on Fort Jackson. Their venomous sting may cause an allergic reaction in hypersensitive individuals and/or lead to secondary infections. Fire ants may also have a detrimental impact on endangered or threatened species.

5. Envenomization from stings of bees, hornets, yellow jackets and wasps may produce lethal allergic reactions in some individuals.

6. Skunks, raccoons, bat, foxes, stray cats and dogs not only can become a nuisance but they may be infected with rabies. Since these animals may be found in or under buildings, the disease potential should be recognized.

7. The copperhead (*Agkistrodon contortrix*), cottonmouth or water moccasin (*Agkistrodon piscivores*), the coral snake (*Micrurus fulvius*), eastern diamondback (*Crotalus adamanteus*), and the timber or canebreak rattlesnakes (*Crotalus horridus*) are poisonous snakes found in South Carolina. Although rarely encountered, these snakes are capable of causing serious illness or death. Do not handle, or attempt to handle, any snake A variety of nonpoisonous snakes are also found in the State; although non-venomous, their bites may be painful and could lead to secondary infection. Snakes from unwanted areas are captured alive and relocated to other areas away from ongoing activities. Removal and relocation of snakes found in unwanted areas (e.g., under buildings) is occasionally required.

B. Quarantine Pests. There are no quarantine pests known to occur on Fort Jackson. If any quarantine pest is suspected, the IPMC should be notified. The IPMC should inform the AEC PMC and ultimately the US Department of Agriculture should be notified.

C. Pests of Real Property.

1. Subterranean termites are found in this region of South Carolina and may cause substantial damage. Structures made of materials, which contain cellulose, will be inspected annually or at a minimum of every other year for termites or termite damage.

2. Carpenter ants and other wood-destroying insects may infest and damage wooden structures. In areas with high moisture, wood-destroying fungi is a potential problem.

3. Birds and bats roost in warehouses, maintenance and other buildings and may damage equipment and supplies with their droppings. Birds requiring control may include the starlings, house sparrows and pigeons.

4. Squirrels, rats and mice are also capable of infesting and damaging structures.

D. Stored Food Product Pests. Food items located in dining facilities, kitchens, or in food storage facilities may become infested by stored food product pests. Most susceptible items are rotated, moved and consumed before infestations occur. The installation Veterinary Food Inspection personnel should be contacted whenever suspect food items are discovered in warehouse or distribution facilities.

Infested food at the consumer level should be considered for disposal. The most common stored food product pests include beetles, moths, and rodents.

E. Invasive Plants and Noxious Weeds.

1. Executive Order 13112. Invasive plants are introduced species that have few, if any, natural controls and spread out of control. Presidential Executive Order 13112 signed 3 Feb 99, requires that each Federal agency shall "prevent the introduction of invasive species", "detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner", and "provide for restoration of native species and habitat conditions in ecosystems that have been invaded." It also requires agencies to "conduct research on invasive species and to develop technologies to prevent introduction and to provide for environmentally sound control of invasive species" and to "not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions." The following criteria are necessary to the resolution of this requirement by FY02-07:

a. Comprehensive survey of the occurrence of incipient populations of alien invasive species at Army installations to be targeted for immediate eradication.

b. Comprehensive survey of the occurrence of alien invasive species at Army installations with training, environmental and prevention control implications to facilitate an effective cost/benefit analysis for Army planners.

c. Identify transportation and other pathways by which alien invasive species enter and exit an installation.

d. Research impacts of- alien invasive species on- Army training site ecosystem management, to include prescribed burning and re-vegetation with native species that supports or is compatible with the Army military mission.

e. Research extent of direct impact of alien invasive species such as musk thistle or kudzu on military training mission and readiness and soldier health and safety.

f. Development and demonstration of targeted application of pesticides such as glyphosate to alien invasive species to avoid non-target organisms and comply with both Executive Order 13112 requiring alien invasive species control and Executive Order 12856 reporting 50% reduction in pesticide usage.

g. Convert information on management techniques, distribution, life histories, invasive characteristics, public education, and human health impacts of alien invasive species from the Federal Native Plant Conservation Initiative fact sheets and other sources, to the standard pest management outlines used in this plan.

2. Invasive Species on Fort Jackson. Over 7 million acres of land throughout the southeast are infested with the invasive plant known as kudzu, *Pueraria montana* var. *lobata*. On Fort Jackson, kudzu is very

common although it does not interfere with the mission of Fort Jackson. Refer to Appendix A, which provides recommendations for controlling kudzu on Fort Jackson. Contact USDA-APHIS with any questions concerning the presence of this invasive plant on Fort Jackson. There are other invasive plants found in South Carolina, but their distribution is very limited in this region of South Carolina and their control is not a high priority.

4. Noxious Weeds. The list of noxious weeds found on Fort Jackson can be found in Appendix N. The Federal Noxious Weed Act prohibits the interstate movement of the identified noxious weeds. The threat of introducing foreign vegetation (i.e. vegetative plant parts or seeds) from foreign soil via retrograde cargo, such as tactical equipment returning from a foreign country, is minimized by having all retrograde cargo cleared by the USDA, APHIS prior to arriving at Fort Jackson.

5. Ecosystem Management. The Office of the Under Secretary of Defense issued a memorandum requiring the implementation of Ecosystem management in the Department of Defense Memorandum, DUSD, (ES/EQ-C), 8 August 1994, subject: Implementation of Ecosystem Management in the DOD. Ecosystem management is elaborated in DOD Instruction 4715.3, DoD Conservation Program and the DOD Commander's Guide to Biodiversity and Handbook for Natural Resources Managers. Special attention should be paid to prescribed burns to mimic natural burn patterns that restore the indigenous ecosystem and control noxious weeds

F. Other Undesirable Vegetation. Weeds along fence lines, on road shoulders, paved surfaces require control using appropriate herbicides. Herbicides should be applied directly to weeds to protect desirable vegetation and reduce contamination of natural resources. Some control of unwanted plants is done mechanically (mowing, string trimmers) or by using mulch materials around ornamental plants. Selective vegetation control may be required for pine planting site preparation or for pine release programs of forested areas. Prescribed burns should mimic natural mosaic pattern, intensity, periodicity, and re-vegetation with native species that helps to control noxious weeds. Executive Memorandum (26 April 1996, Clinton) directs federal executive departments and agencies to use regionally native plants for landscaping of federal grounds and federally funded projects. The use of native plants protects natural heritage and provides wildlife habitat. Native plant restoration may reduce the need for fertilizer, pesticides, and irrigation requirements because native plants are best suited to the local ecosystem.

G. Vertebrate Animal Pests.

1. Mice and rats occasionally invade buildings. Primary management techniques for controlling these rodents are exclusion and sanitation. Snap traps and glueboards are the main method used for controlling rodent infestations indoors. Rodenticides may be used provided they are deployed in tamper/child proof bait stations

2. Beaver, skunk, raccoon, squirrels and deer have periodically required control. Control efforts for beaver or other regulated wildlife species such as deer will be coordinated with the installation Natural Resources personnel, Game Warden office, and South Carolina Department of Natural Resources. Additional assistance may be obtained if necessary from the U.S. Department of Agriculture (USDA), Animal, Plant, Health Inspection Service (APHIS), Wildlife Services. The local U.S. Fish and Wildlife Service will be contacted to coordinate efforts to control federally protected species.

3. Stray dogs and cats occasionally need to be captured on Fort Jackson. Contractor Pest Control personnel and the Military Police are responsible for the control of stray or wild animals. Refer to AFPMB TIM 37, Guidelines for Reducing Feral Cat Populations for additional guidance.

4. Birds (non-protected species) and bats are occasional pests in and around buildings. They represent a general nuisance for building occupants and can contaminate stored materials and floors with their fecal droppings. Bird droppings can pose a health threat. Because a disinfectant should be used to neutralize the disease threat, the treated fecal dropping waste material from clean-up operations can be an environmentally sensitive issue.

H. Household and Nuisance Pests. Rodents, crawling insects (such as ants, cockroaches and spiders) may require control in office, billeting, food service facilities, warehouses, and other administrative buildings. Proper sanitation and physical exclusion are emphasized to discourage these pests.

I. Ornamental Plant and Turf Pests. Various insect pests causing damage to plants can infest trees and shrubs. Examples of these pests include the southern pine beetle, white grubs, webworms, and tent caterpillars.

J. Other Pest Management Requirements. Pest management technicians, maintenance personnel and the military police are responsible for carcass removal. In addition, the pest management technicians may provide services for odor control in buildings and other structures. Odors may arise from dead animals, decaying vegetation, molds, fungi, or from other sources.

IV. CONSERVATION PRACTICES FOR ENDANGERED SPECIES.

A. The Endangered Species Act requires EPA to regulate pesticides in such a way as to protect endangered species. Three Federal listed endangered species have been identified on Fort Jackson.

B. EPA's endangered species pesticide program requires pesticide applicators to be aware of information not on pesticide labels about endangered species requirements. Special considerations must be taken when using pest control tactics in areas where endangered species are found.

C. AR 200-1 requires personnel to protect and conserve endangered and threatened species, and candidate, proposed, and state protected species as though they were endangered.

D. See Appendix O for the list of Federal and State or candidate endangered or threatened species listed in South Carolina. These lists change frequently as species are added or removed.

V. HEALTH AND SAFETY CONSIDERATIONS.

A. Medical Surveillance of Pest Management Personnel. All Fort Jackson governmental employees who apply pesticides should participate in a medical surveillance program for pesticide applicators. A medical surveillance program should consist of the following elements:

1. An initial physical examination will be conducted to establish that the individual is physically capable of wearing a respirator (if required) and to establish a baseline red blood cell (RBC) cholinesterase level. This physical examination also includes liver and kidney function tests, a complete blood count, and a respiratory evaluation. A physical examination of the same scope as the initial examination is conducted annually.

2. When cholinesterase-inhibiting substances (CIS) (i.e., carbamate or organophosphate insecticides) are applied by employees on a regular basis, the RBC cholinesterase level will be monitored at least twice a year (before and mid-season during the time of heaviest pesticide usage). Very few CIS pesticides are applied in current pest management programs.

3. Annually, the air in the pesticide applicator's breathing zone should be sampled by an Industrial Hygienist to evaluate potential pesticide exposures to pesticide applicators.

4. DOD personnel who handle or otherwise come into contact with wild mammals on Fort Jackson are candidates to receive rabies prophylaxis at the discretion of the Installation Medical Authority.

5. Contractor personnel performing pest management services are responsible for receiving their own medical examinations and rabies prophylaxis from private sources at their expense. Pest control contractors shall observe all safety precautions throughout the performance of their contract, and shall assume full responsibility and liability for compliance will all applicable regulations pertaining to the health and safety of personnel during the execution of work, and shall hold the government harmless for any action on its part or that of its employees that results in illness, injury or death.

6. All federal employees that apply pesticides or serve as COR/QAEs must be provided with respirators (approved for use with pesticides and fumigants) that are fit-tested, annually, to the individual employee. Pesticide applicators shall carry on their person, a current fit-test card identifying the make and model of the respirator fitted and date of fit-test.

B. Hazard Communication. Installation personnel who handle or are exposed to hazardous materials, including pesticides, in the workplace are given hazard communication training. Following initial hazard communication classes, additional training is given annually, and when new hazardous materials are introduced into the workplace. Employees who handle hazardous materials are required to read the Material Safety Data Sheets (MSDS) for all products and their supervisors provide workers instruction on appropriate safety procedures for each product. MSDSs for all pesticides and other hazardous materials used in the pest management program are maintained on the installation by supervisors of pesticide applicators and by the IPMC. MSDSs should be immediately available to personnel exposed or potentially exposed to such materials. Copies of MSDSs are kept in all work areas and copies should be in applicators' pest control vehicles for those pesticides to be used that day. All pest control activities are required to submit to the IPMC copies of MSDS and product labels for all pesticides used in contracted pest management operations.

C. Pesticide Worker Safety Requirements. Respirators (NIOSH approved for use with pesticides), chemical resistant gloves and boots, splash-proof goggles, and protective clothing, as specified by applicable laws, regulations and /or pesticide label (and MSDS) will be worn by personnel exposed to pesticides. For clarification of pesticide label requirements, if label states: 'Do not breath vapors, mist,…", then applicators shall wear a respirator approved for pesticides; "Do not get in eyes", then

applicators shall wear splash-proof goggles, face shield or full-face respirator; and "Do not get on skin", then applicators shall wear chemical-resistant gloves, long-sleeved shirt and long pants. Pesticide-contaminated protective clothing will not be laundered at home. Severely contaminated clothing should not be laundered, but should be considered a pesticide-related waste product and disposed in accordance with current waste disposal regulations. Disposable coveralls may be used. Contractors are responsible for providing these items and services to their employees at no additional expense to the government. The proper care and maintenance of respirators can be found in Appendices P.

D. Pesticide Storage and Mixing Facilities (Buildings 2558 and 3664). The government-owned pesticide storage and mixing facilities shall be included in the ventilation surveillance support for this facility that is conducted by the Industrial Hygiene Section, Preventive Medicine Services. Pesticide storage areas are monitored to provide at least 6 air changes per hour. The ventilation hoods of indoor pesticide mixing areas are to have a minimum of 150 fpm face velocity. Personnel are prohibited entrance into the pesticide storage areas for at least 10 minutes after activation of the ventilation system to ensure at least one air change prior to entrance.

E. Fire Protection.

1. The usual hazards presented by a fire are compounded in the case of a pesticide fire by the danger of pesticide poisoning and contamination. The IPMC will conduct pre-fire coordination with appropriate fire department and other emergency officials when pesticides are stored in Fort Jackson facilities. This coordination will be formalized in the installation pre-fire plan. Facility managers update the pre-fire plan annually, or when changes occur in the amount or types of pesticides stored. Copies of this plan are provided to the installation fire departments. In those facilities where minor amounts of self-help type pesticides are stored (e.g., aerosol insecticides, over-the-counter ant or cockroach baits, etc.), a pre-fire plan may not be required, (consult with Fire Department personnel). However, facility personnel must follow all label precautions that deal with the storage of these pesticides.

2. The pre-fire plan includes a pesticide inventory, storage area floor plan, evacuation routes, water runoff control, and map of the surrounding area, emergency telephone numbers, medical assistance, salvage/hazard assessment, and provisions for safety briefings of appropriate personnel. A detailed discussion of pre-fire planning can be found in paragraph 2 of Armed Forces Pest Management Board (AFPMB) Technical Information Memorandum (TIM) No. 16.

F. Pest Control Vehicles. Whenever possible, pesticides are transported in a lockable storage compartment of an assigned vehicle(s). Vehicles that have been used to transport pesticides and/or contaminated pesticide application equipment are not to be used for transport of food, medical supplies or other sensitive items that, if contaminated, would adversely affect human health. Transportation of pesticides (from supply, delivery of self-help type items, etc.) is accomplished using the vehicle assigned to the pesticide applicator. Pesticides and contaminated equipment are never transported in the passenger compartment of any vehicle. In addition, care is taken to secure pesticides to prevent damage to the containers and spillage of the chemicals. At no time are pesticides to be left unsecured in the vehicle when unattended. A portable eye lavage and spill kit shall be carried in each pest control vehicle.

VI. ENVIRONMENTAL CONSIDERATIONS.

A. Protection of the Public. Only certified pesticide applicators [DOD certified for government staff and South Carolina certified for pest control contractor(s)] are permitted to apply pesticides on the installation. Precautions are taken during pesticide applications to protect the public on and off the installation. Pesticides will not be applied outdoors when the wind speed exceeds 10 miles per hour or less if restricted by the label. Pesticide applicators shall have a means to monitor the wind speed during outdoor pesticide applications. Whenever pesticides are applied outdoors, care is taken to make sure that any spray drift is kept away from individuals, including the applicator. Residual sprays, dusts, etc. will not be applied in the immediate area of building interiors while occupied by personnel other than pesticide applicators or other personnel wearing appropriate personal protective equipment. Building occupants are instructed not to re-enter a treated building until pesticide has dried and odors have dissipated, usually 2 hours, less if permitted by the pesticide label. Application of non-intrusive pesticides, such as baits, is permitted in occupied buildings.

B. Sensitive Areas. Special consideration must be given prior to conducting pest control operations in sensitive areas that are identified on pesticide labels. No pesticides are applied directly to wetlands or water areas (ponds, lakes, streams, rivers, drainage into fish habitat, etc.) unless its use is specifically approved on the label and the proposed application is approved by the DPW Environmental Office. In addition to aquatic habitats, sensitive areas also include habitat of endangered, threatened, or rare flora or fauna species, and unique geological and other natural features. Other sensitive areas include medical treatment facilities, child-development centers, playgrounds, and schools.

C. Endangered and Protected Species.

1. All migratory birds (except starlings, pigeons and house sparrows) that occur on Fort Jackson property cannot be controlled without a permit. The IPMC will periodically evaluate ongoing pest control operations and will evaluate all new pest management operations to ensure compliance with the Endangered Species Act and Migratory Bird Treaty Act. No pest management operations are conducted that are likely to have a negative impact on endangered or protected species or their habitats without prior approval from the AEC PMC.

2. Appendix O lists plant and animal species that are considered to be endangered, threatened, or rare in South Carolina.

3. Protected Habitat. No pest management operations are conducted in habitats that are likely to have a negative impact on endangered, threatened or protected species or their habitats without prior approval from the AEC PMC.

D. Pesticide Spills and Remediation. Spill cleanup materials are maintained on the installation as part of the Emergency Response Program. Whenever a pesticide is spilled, the Fire Department is notified for First Responder Level II and III support. All pesticide applicators shall be trained as First Responder Level I and as Hazardous Waste Handler/Supervisor. All pesticide storage buildings and pest control vehicles are equipped with spill kits. General information relating to pesticide spills is found in AFPMB TIM 15, Pesticide Spill Prevention Management, June 1992. Specific guidance is found on the product's MSDS and its label. All spilled pesticides are managed under the installation's Hazardous Waste Management Program and are reported to the Environmental Office, the IPMC and the installation's Hazardous Waste Coordinator.

E. Pollution Prevention (P2). This pest management program will comply, whenever possible, to Executive Order 12856 of August 3, 1993, Federal Compliance With Right-to-Know Laws and Pollution Prevention Requirements. Controlling pests with pesticides are considered only after non-chemical control methods have been exhausted. IPM strategies that stress nonchemical control form the basic framework of this installation's pest management program. See Appendix Q, for Pollution Prevention Guide for Pest Management Operations.

F. Prohibited Activities.

1. Non-certified Pesticide Applicators are prohibited from applying pesticides.

2. At no time will a pesticide be used in any manner that is inconsistent with its label. The site of application must be identified on the pesticide label. Pesticides shall not be applied at rates higher than those specified on the label.

3. The rate of pesticide application for termite control shall not be less than those specified on the label.

4. Only those pesticides that have been approved by AEC PMC and listed in this IPMP (Appendices A and D) shall be procured for application on the installation. No cancelled-use pesticides shall be procured.

G. Pesticide Approval. Only those pesticides that have been approved by the AEC PMC shall be procured for application on the installation. Prior to seeking approval of any new pesticide or technology, its usage must be evaluated in relationship to other pesticides used on the installation and to ensure adequate safety equipment is on-hand prior to receipt of the product. Submit the Pesticide Approval Request form (Appendix B) to the IPMC who will forward it to the AEC PMC for approval.

H. Pesticide Application Equipment Calibration. The calibration for all pesticide application equipment shall be maintained current. All application equipment that is used seasonally shall be calibrated at least at the beginning of each spray season. Calibration shall also occur after replacement of key applicator parts such as nozzles, engines, pumps, etc. Calibration shall also occur within the time interval specified on pesticide labels. When queried, a pesticide applicator, who is observed applying pesticides, shall know the pesticide labeled rate of application, the equipment's calibrated rate of application and the quantity of pesticide required to treat the site. Appendix R lists the government-owned pesticide application equipment used on Fort Jackson.

I. Disposal of Pesticide Waste Materials. All pesticide applicators shall be trained in the disposal of hazardous wastes and non-hazardous (regulated) wastes.

1. Concentrated Pesticide Formulations. Unless otherwise directed, all pesticide concentrates will be used only for their intended purpose (Appendix A). Concentrates that are excess, unserviceable or those whose EPA registration has been suspended or cancelled will be disposed of in accordance with Federal, Army, and State of South Carolina laws, rules or directives. Those concentrates awaiting disposal shall be identified to the installation's Hazardous Waste Coordinator and shall be stored in a designated hazardous waste storage facility. Waste pesticide shall be disposed in accordance with the installation's Hazardous Waste Disposal Program.

2. Formulated Pesticides. Appropriate planning will be taken to assure that only the proper amount of chemical will be mixed to complete the assigned work. Equipment used to disperse pesticides shall be

inspected and calibrated to ensure proper operation, uniform coverage and proper application rates during the application of pesticides. All formulated pesticide shall be applied to the designated treatment site. If any mixture remains due to equipment failure, it will be containerized and/or transferred to another sprayer and applied as soon as possible. Any remaining formulated pesticide will be used as diluent for subsequent spray operations using the same concentration or formulation appropriately to ensure correct final concentration. Small quantities of formulated liquid pesticides, such as residue remaining in hoses and booms of power sprayers, will be applied to the treatment area during clean-up procedures.

3. Rinsates. Rinsates from triple rinsing concentrated pesticide containers will be immediately added to spray tank as part of pesticide formulation.

4. Leakage Residues and Large Spills. Pesticide spills can best be reduced and prevented by taking precautionary measures such as maintaining adequate pesticide storage facilities, frequent inspection of facility, equipment and pesticides and other stored hazardous material containers, and maintaining emergency spill clean-up kits. Procedures to follow for prevention and response to spills are outlined in AFPMB Technical Information Memorandum 15, Pesticide Spill Prevention and Management. All pesticide applicators shall be trained as First Responders (Level I) at a spill site involving a hazardous material. Pesticide spills in the storage area of pesticide storage buildings are contained within the storage area by at least three inch curbing around the base of the walls and floor. Mixing and storage areas do not have floor drains. The vehicles of pesticide applicators and the pest control shops shall be equipped with spill kits. The pesticide applicators shall have communication access, such as radios or cell phones, to report any emergency involving spilled pesticides while at local and remote sites. All contaminated materials, including cloth, soil, wood, etc., that can not be effectively decontaminated, will be removed and placed in sealed leak-proof containers. All containers will be properly labeled and disposed of through the installation's Hazardous Waste Management Program. Personnel who handle pesticide and other hazardous material waste shall be trained as Hazardous Waste Handlers or Supervisors.

5. Empty Pesticide Containers. Empty pesticide containers shall be disposed in accordance with the pesticide label directives and installation policies.

J. <u>Pest Management Operations with Special Environmental Considerations</u>. All pest control operations having special environmental considerations must be approved by the AEC PMC.

1. Use of Restricted-Use Pesticides. Restricted-use pesticides, as well as general-use pesticides, shall only be applied by certified pesticide applicators. Fish control using rotenone (Noxfish® or similar) and nematode control using Nemacur® or Curfew® at the Fort Jackson Golf Club are the only pest control programs that anticipates the use of a restricted use pesticides.

2. Potential for Contamination of Surface and Groundwater. Programmed pest control operations are not planned where the pesticide could contaminate surface and ground water via movement of pesticides off-target. The major potential for movement of pesticides off-target is via an accident involving pesticide application equipment having large capacity tanks or hoppers. The installation has the potential to treat aquatic areas for weed and algae growth using herbicides that have been EPA approved for direct application in and around aquatic sites. Also aquatic, mosquito-breeding sites may be treated with EPA approved pesticides and application techniques. The soil around and under buildings is treated for termite control using EPA approved pesticides and control techniques.

3. Treatment of more than 640 Acres. No pest control procedures are programmed for areas over 640 continuous acres.

4. Site(s) with Endangered and Protected Species. The red-cockaded woodpecker (RCW) is a significant concern on Fort Jackson and its management is described in detail in the Fort Jackson Integrated Natural Resource Management Plan. Migratory birds, except starlings, pigeons and sparrows, are Federally-protected species. Any bird management program involving protected migratory birds will be coordinated with the US Fish and Wildlife Service and the AEC PMC. A migratory bird depredation permit must be obtained prior to conducting any bird management program involving migratory birds. Fur-bearing and game animals are protected by the South Carolina Department of Natural Resources laws and regulations. Personnel involved in Nuisance Animal Damage Control operations must be licensed and permitted by the State of South Carolina. Management of these animals is discussed in this document (Appendix A).

5. All Aerial Application of Pesticides. No aerial applied pesticides are programmed for use on the installation. In the event an aerial pesticide is considered for use, the IPMC shall complete an Aerial Spray Statement of Need (ASSON) (AEC Guidance and Policy) and submit it to the AEC PMC for approval prior to implementing aerial spray operations.

6. Control of Noxious and Invasive Weeds. Management of Noxious and Invasive Weeds on Fort Jackson has been discussed above in paragraph IV.E.

7. Operations involving Experimental-Use permits. No pest management operations are anticipated that would involve use of experimental-use pesticides.

8. Operations in and around Environmentally Sensitive Areas. No pest control operations are programmed in and around environmentally sensitive areas except as stated above.

VII. ADMINISTRATION.

A. Operations. Pest management operations will be conducted in accordance with Appendix A, IPM Outlines.

B. Work Orders. Work orders for pest control services are issued in response to complaints from building occupants. Complaints are referred to individual building coordinators. If the pest problem cannot be handled by self-help methods, then pest control services support section is notified.

C. Contracts.

1. Augmentation contracts are used when essential pest management activities are beyond the capabilities of installation personnel. Pest problems threatening the health, safety or welfare of installation personnel are given priority. Contracts are administered in accordance with DoDI 4150.07 and installation contracting procedures.

2. The IPMC, in conjunction with the AEC PMC will be involved in the preparation of any augmentation contract for pest control. Contracts will be written using the guidelines found within AFPMB TIM 39.

3. In accordance with Executive Order (EO) 12856 and Secretary of Defense Memorandum, Subject: Comprehensive Pollution Prevention Strategy, 11 August 1994, pest management contracts are initiated on an "as needed" basis. Monthly or periodic spraying will be eliminated unless deemed necessary after surveying and monitoring pest population levels. Use of integrated pest management techniques will be encouraged in all contracts. The justification for pesticide use varies depending on the degree of urgency of a pest problem. For example, any pest that threatens the health, safety, and welfare of personnel would most likely justify the use of pesticides (after non-chemical strategies have been tried) as opposed to landscaping pest problems that merely threaten the aesthetics of an area. Pest problems threatening the health, safety, or welfare of installation personnel shall receive priority. Contracts for recurring pest problems and on-going pest control are processed as an annual, semiannual, quarterly or monthly pest control service.

4. Ongoing contracts are evaluated annually or as necessary. Prior to any payment being made an evaluation to confirm the satisfactory completion of all work is performed.

5. Contractors who conduct pest control on Fort Jackson must:

a. Show proof of liability insurance and provide/maintain a current South Carolina Pesticide Business License as a business engaged in applying pesticides.

b. Have (at a minimum) South Carolina commercial pesticide applicator certification(s) and pesticide business licensing in the following category or categories of work to be performed:

South Carolina	**Description**
2	Forest Pest Control
3	Ornamental and Turf Pest Control
5	Aquatic Pest Control
6	Right-of-Way Pest Control
7A	Industrial, Institutional, Structural and Health-Related Pest Control
8	Public Health Pest Control

c. Use only EPA and South Carolina registered pesticides. Cancelled-use or suspended-use pesticides shall not be transported on to this installation from off-installation sites for application or disposal.

d. Furnish Fort Jackson IPMC with legible copies of specimen labels and the MSDS of all pesticides proposed for use (if not included in Appendices A and D).

e. Furnish IPMC with information that specifies the date, location, site, size of treatment site, type of pest control operation, pests controlled, the pesticide(s) used (trade name, common name, EPA registration number, formulation, concentration of active ingredients (%) as applied, the amount used and diluent), the time expended for each pesticide application, certified pesticide applicator's name and certification number. This information is entered by pest control personnel on the daily Pest Management Maintenance Record (DD Form 1532-1) for the each building or site where the work was performed. Appendix L provides pest management record keeping guidance.

f. Apply pesticides in accordance with pesticide label requirements and provisions established in this IPMP.

g. The Contractor(s) must comply with all applicable Federal, Army, South Carolina, Army and local laws, regulations and directives.

h. Pesticides must be mixed, stored and disposed in accordance with Federal, Army, South Carolina and local laws, regulations and directive and with procedures established by the installation.

i. Pesticides and pesticide application equipment shall only be stored in approved pesticide storage buildings. Pesticides stored on a pest control vehicle must be secured in lockable storage compartments.

j. Maximize the implementation of nonchemical control methods prior to applying pesticides and select approved pesticides that help the installation achieve the DOD Pest Management MOM #2, 50% Pesticide Usage Reduction Goal. (See attached MoM's update).

D. Resources.

1. Pesticides are ordered as required. There is no need to maintain more than a three-month supply in stock, unless budget freezes have historically prevented procurement of the pesticides in a timely manner during the high-demand summer months. Inventories of pesticides (other than those authorized for self-help use) and pesticide application equipment are maintained by managers at each location at all times. Pesticides that are required for use during a specific time of year (e.g., herbicides for seasonal use) are timely ordered to ensure effective application. The inventory of pesticides provided at Appendix D lists the pesticides available for use on Fort Jackson. These inventories are provided quarterly to the IPMC. Document the quantity of pesticides on-hand and the quantity of pesticide used during the quarter (pounds of active ingredient). These inventories are updated, as changes occur but not less than quarterly.

2. Pesticides used by contract pest control services shall not be stored on Fort Jackson. Pesticides that are part of the U-Do-It Program will be stored in locations where food, clothing and other personal items cannot be accidentally contaminated and which are secured.

3. A vehicle with separate lockable storage areas and cab will be used for the safe transport of personnel, pesticides, equipment, and supplies for pest control operations. Pesticides are never transported in the cabs of vehicles.

E. Reports and Records.

1. Adequate records of all pest management operations performed by contracted pest control company(s), Fort Jackson Golf Club, Preventive Medicine Services and Veterinary Activity Food Inspector personnel, sub-contractors, and self-help users are maintained by installation personnel. Appendix L provide guidance in completing pest management records.

2. Daily pesticide application and surveillance records are maintained using the daily DD Form 1532-1 (Pest Management Maintenance Record) or approved equivalent. These forms are properly maintained to provide a permanent historical record of pest management operations for each building, structure, or outdoor site on Fort Jackson.

3. If it is found that DD Form 1532-1 does not meet the requirements for record keeping dictated by the state of South Carolina, a State-generated or locally reproduced form which serves the same purpose may be used.

F. <u>Training and Certification</u>.

1. All Fort Jackson personnel who apply pesticides shall have received and maintained DOD (government staff) or South Carolina (Contractors) certification as pesticide applicators for the categories of pest control engaged.

a. Federal personnel applying any pesticide on federal land need DOD certification IAW AR 200-1 chapter 5. Only Federal employees under hiring programs with duties as pesticide applicators can participate in the on-the-job (OJT) training program. During this time, the new employee works under the direct supervision (see paragraph 2 below) of a certified pesticide applicator, until they are qualified (1 year OJT experience) and satisfactorily complete the DOD Pest Management Certification Course and can work independently.

b. Civilian contractors applying any pesticide on Fort Jackson property require a South Carolina certification in the category or applicable sub-categories of work performed. All of the contractor's pest management staff, who apply pesticides, must be certified as pesticide applicators. Non-certified contractor employees are prohibited from applying pesticides.

c. Applicators of approved self-help pesticides need no certification if not employed as pesticide applicators. Also, occupants of family housing are permitted to apply general-use pesticides in and around their assigned quarters for their personal relief and for their family members. Application of any pesticide to neighboring residences is prohibited.

d. Certification is required for the IPMC in the appropriate categories of work, which occur on the installation.

e. Individuals who evaluate the quality of work of pest control contracts (QAEs) should also be trained in the pest management category or categories of work being performed.

2. Direct supervision is defined in DOD Instruction 4150.7 as supervision that includes being at the specific location where pest management work is conducted; providing instruction and control; and maintaining a line-of-sight view of the work performed. Certain circumstances may temporarily remove the line-of-sight view of the application of pesticide from the supervisor such as topographic, vegetation, or structural constraints. Under these temporary circumstances, the supervisor shall be responsible for the actions of the pesticide applicators.

3. Training and certification will be conducted at government expense for DOD personnel. Certified pest control personnel shall be re-certified IAW DOD requirements as specified above. Employed pesticide applicators must be certified and the quality assurance evaluator must be trained in the

following categories when appropriate. Certification and training is required when performing pest control operations that involve restricted-use or state-limited use pesticides, to supervise other employees conducting pest control involving restricted-use or state-limited use pesticides, or to evaluate contractor performance relating to pest control within these categories:

DOD	South Carolina	Description
2	2	Forest Pest Control
3	3	Ornamental and Turf Pest Control
5	5	Aquatic Pest Control
6	6	Right-of-Way Pest Control
7	7A	Industrial, Institutional, Structural and Health-Related Pest Control
8	8	Public Health Pest Control

4. Personnel, who are involved in pesticide applications on a regular or seasonal basis, are encouraged to attend local pest management classes, workshops, seminars, etc. This is important in order to keep abreast of pest problems and pest management techniques, which are unique to the area surrounding the installation. This is particularly true when dealing with vegetation control since many of the herbicide labels indicate that choices in strength and application technique should be based on local conditions. The time and labor expended in this type of training is easily recouped through improved efficiency in pest management. Local pest management training may include on-site training in addition to any off site re-certification training, such as the DOD course or State re-certification requirements. Other personnel who deal directly with pest control operations, but who may not need to be certified, are also encouraged to attend local seminars to better understand pest management needs.

G. Quality Assurance/Quality Control.

1. The QAEs for pest management contracts must be trained in pest management and pesticide application techniques. It is strongly recommended that they be DOD certified in the EPA categories for which pest control work is performed at Fort Jackson.

2. Pest control services are expected to provide a satisfactory level of control while minimizing pesticide applications. The IPMC and a designated pest management QAE will provide the installation pest management program oversight by insuring only approved pesticides are utilized and nonchemical controls are maximized. Work performed by the Contractor(s) will be evaluated based on the adherence to the contract performance work statement and the requirements established in this document. Pest control operations that are in violation of Federal, U.S. Army Regulations shall immediately cease operations until the deficiency is corrected. Because the pesticide label is the law, any pesticide label violation will result in an immediate cease work order by the Contracting Officer.

H. Design/Review of New Construction. Construction projects on Fort Jackson are reviewed with pest prevention and control in mind. Personnel from the Preventive Medicine Service review designs of new structures and conduct a pest evaluation in the constructed facility prior to completion of the project. This is to ensure pest entry points and potential harborage have been eliminated and those pre-construction termite treatments have been included in project specifications.

I. Termite and Building Inspection Plan. All installation buildings shall be inspected for damage and infestations of termites and other wood-destroying pests. Wood-destroying pest inspections shall be documented and the results (positive or negative) shall be provided to the IPMC. Appendix T provides a suitable form for termite inspections and treatments on U.S. Army property. The Contractor shall provide the IPMC a building inspection plan outlining timeframes when buildings will be inspected.

J. Pest Control Shop and Equipment Security. Pesticides and pesticide application equipment shall be secured when not in use. Personnel responsible for the pesticides and pesticide application equipment shall control access into the storage facility.

K. Annual Pest Management Work Plan. The activities engaged in pest management support shall develop annual work plans to establish pest control missions and to program resources, such as manpower, equipment and pesticides, to complete the missions. A copy of the annual work plans shall be provided to the IPMC. The IPMC shall monitor pest management records for compliance with the annual work plans.

VIII. COORDINATION - DOD, Other Federal, State, and Local.

A. The AEC PMC will review this pest management plan initially and annually thereafter. Special attention will be given to any pesticide application that was addressed in paragraph VII.J.

B. Liaison will be maintained between the Preventive Medicine Service and Local County and State health agencies to determine the prevalence of disease vectors and other public health pests in the areas surrounding Fort Jackson.

C. A list of useful organizations and contacts throughout South Carolina who are involved with or who may impact the Fort Jackson Pest Management Program is found in Appendix F. A list of federal resources, including their addresses, telephone numbers, and a description of their responsibilities is provided in Appendix G.

D. County health and environmental personnel are coordinated with for proposed actions, which may impact adjacent off-post areas or where pests located in off-post areas are impacting Fort Jackson property or personnel health.

E. Wildlife control is coordinated with the USDA, APHIS, South Carolina Wildlife Services, or local game enforcement officers when wildlife damage control is necessary.

F. The IPMC coordinates with the Army Corps of Engineers to ensure that pesticide application, such as termite pretreatment for all new construction, is properly performed and documented.

G. The Fort Jackson IPMC may also coordinate with County Cooperative Extension offices and USDA Natural Resources Conservation Offices to obtain information about the identification and control of specific pests in their locale or to obtain County Soil Surveys.

IX. SALE AND DISTRIBUTION OF PESTICIDES.

A. Self-Help Pest Management Program. Pest control items are available to family housing residents through the U-Do-It (self-help) store, located in housing maintenance contractor's building . Family housing occupants are required to attend a class on the self-help pest management program. Records are kept of items issued to housing occupants; this information is provided monthly to the IPMC. Refer to AFPMB TIM 42, Self-Help Pest Management for additional guidance. The list of authorized self-help items is listed in Appendix I.

B. Army Air Force Exchange Service. Pesticides sold in the Main Post Exchange, Bldg 4110, are registered by the EPA for general-use; restricted-use products are not sold. Pesticide products are grouped into several separate categories: products applied to pets for ectoparasite control, repellents, household, and lawn and garden products. A spill cleanup kit is on hand in the immediate vicinity of the home and garden pesticide storage area. Store personnel are familiar with the use of the cleanup kit and with installation spill contingency procedures. Additional guidelines on pesticides in exchanges can be found in AR 40-5 para 10-4h.

C. Commissary. Pesticides sold in the Commissary are registered by the EPA for general-use; restricted-use products are not sold. Pesticide products are ready-to-use. A spill cleanup kit is on hand. Store personnel are familiar with the use of the cleanup kit and with installation spill contingency procedures. Additional guidelines on pesticides in commissaries can be found in paragraph 10-4h, AR 40-5.

D. Veterinary Clinic. The Veterinary Treatment Facility sells products containing pesticides to customers for their own use. These products are registered by EPA and are labeled for application to animals.

APPENDIX A

INTEGRATED PEST MANAGEMENT OUTLINES

INTEGRATED PEST MANAGEMENT OUTLINES

1. The following IPM Outlines identify the procedures and methods that are used on the installation to control the pests encountered that could adversely affect the installation mission, government property, or health. Nonchemical techniques are designed to eliminate entry and harborage for pests in buildings, improve sanitary conditions that deny pests food and water, to modify the environment to discourage pests, to use biological methods to suppress pest populations and to reduce the amount of pesticides placed into the environment. Installation personnel, who are not specifically trained in pest management and who are not certified in pesticide application may implement the following examples of nonchemical controls:

a. Elimination of pest harborage such as caulking or weather stripping.

b. Control of vegetation by mowing, mower height adjustments, irrigation, and fertilization.

c. Implement sanitary practices to deny pests food sources.

2. Various pesticides are listed in the chemical portion of the IPM Outlines and the Pesticide Usage Proposal (PUP) (Appendix D). If the contractor or in-house pesticide applicators intends to use any other pesticides, then information on the proposed pesticide request form (Appendix B, Pesticide Approval Request) shall be submitted to the IPMC for appropriate approvals. Application of pesticides in sites and for pests not included in the IPM Outlines must be coordinated with the IPMC prior to usage.

3. Each IPM Outline includes the Basis for Treatment (preventive and corrective thresholds, as applicable). Routine, preventive-pesticide applications are prohibited accept for those pests and occasions identified in the IPM Outlines, such as mosquito larval control, weed control using soil sterilants or pre-emergent herbicides, and treatment of vacant quarters with boric acid.

4. The chemical section of each IPM Outline also contains a Control Standard. The information in this section sets the minimum level of control following pesticide applications. If pests are not controlled to this standard following treatment, the pest controller must take appropriate corrective actions to resolve the pest problem. Conditions that are outside the influence of the pest controller must be reported to the IPMC.

APPENDIX A
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INTEGRATED PEST MANAGEMENT OUTLINE NO. 1

PEST: Bees and Wasps.

SITE: Buildings and other structures and other public use areas.

I. Purpose: To control these medically significant insects which can cause painful stings and possible allergic reactions in hypersensitive individuals.

II. Surveillance.

A. Conducted by: Building occupants and maintenance personnel. Pest management technicians in response to service requests where professional assistance is needed (typically when the nests are difficult to reach or find). Pest management QAEs may perform surveys for quality assurance of contractual pest management services.

B. Methods: Visual observation.

C. Frequency: Unplanned visual observations by building occupants and maintenance personnel. Pest management technicians perform surveys when services are requested when nests are difficult to find or reach. Pest management QAEs performs surveys as follow up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

III. Pest Management Techniques.

A. Non-chemical

1. Type: Mechanical and Physical.

a. Method and Location: Exclusion by screening windows and doors and caulking gaps or crevices in exterior structural materials to prevent access. Physical removal of mud dauber nests with forced water. Above grade paper nests removed after chemical treatment or vacuuming. Vacuums may be used to remove wasps from nests or yellow jackets as they fly in or out of structures. Physical removal of hives and swarms. Hive material (i.e. wax, honey, and dead bees) in walls are removed from treated sites. Honeybee excluder use is encouraged for use by beekeepers when removing colonies for within walls.

b. Conducted by: Building occupant or maintenance work. Personnel. Hive and swarm removal is performed by local beekeepers whenever possible.

2. Type: Cultural.

a. Method and Location: Method and Location: Bees and wasps are attracted to meat, sweets, and other possible trash items; therefore sanitation practices such as sealing refuse in plastic bags and using tight fitting lids on refuse receptacles is implemented. Flowering plants, such as hollies or *Euonymus* species shrubs, which attract wasps, are not planted close to frequented sidewalks, outdoor benches and picnic tables, or building entrances.

b. Conducted by: Sanitation practices are performed by building occupants and vegetation selection and planting is performed by facility operations personnel or contractors.

B. Chemical

1. Basis for Treatment: **Corrective Threshold:** any observed nests, hives or swarming activity that interferes with human activity.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 7; SC Category 7A

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: No visible signs of wasps after treatment.

IV. Precautions for Sensitive Areas: Do not apply insecticide diluted with water into electrical wire areas. Extreme caution is used around electrical lines when using metal ladders and aerosol extension poles.

V. Prohibited Practices: IAW labeled instructions.

VI. Environmental Concerns: Treat areas carefully to prevent loss of any desirable honeybees.

VII. Remarks: Honeybees are destroyed only as a last resort. Beekeepers are called when swarms of honeybees are found in order to preserve the queen and her workers and removal of live honeybees from within walls is encouraged. Chemical use is the last resort for control. Bee access sites into structures are sealed. Entrance holes of bumble bee and yellow jacket nests in the ground are covered with soil immediately after treatment. Exposed nests of wasps and hornets are removed and disposed of away from the treatment site after the live wasps are killed. Relocate flowering shrubs, which are planted close to sidewalks, building entrances, and other public use areas.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 2

PEST: Mosquitoes.

SITE: Cantonment areas.

I. Purpose: To reduce mosquito populations thus reducing bites and the potential for mosquito-borne disease transmission to humans, such as West Nile virus, St. Louis, and Equine Encephalitis that occurs in South Carolina.

II. Surveillance.

A. Conducted by: Preventive Medicine personnel, and Pest Control Operators in conjunction with their other duties.

B. Methods: Surveys for larvae in standing water that has existed for 5 or more days. Landing count surveys may be used in areas where day-biting mosquitoes are a problem. Light traps used with dry ice, Mosquito Magnets and gravid traps will be used to survey for nocturnally active mosquitoes and for collecting mosquitoes to be tested for West Nile virus. Follow surveillance procedures found in TB MED 561 and provided by USACHPPM-South, Entomological Sciences Division (ESD).

C. Frequency: Weekly surveillance for adult and larval mosquito populations during the period March through October should be conducted. Light trap surveillance should be conducted on a regular weekly schedule. Larval surveys are done in conjunction with other duties. Larval and adult mosquito surveys are also performed when complaints from personnel or area residences are received. If a mosquito-borne disease is identified in the vicinity of Fort Jackson, the use of light traps and other surveillance methods should be increased.

III. Pest Management Techniques.

A. Non-chemical. NOTE: Pesticides are used only to supplement non-chemical control methods.

1. Type: Mechanical and Physical.

a. Method and Location: Screens should be placed in windows to exclude mosquitoes. Temporary standing water sites that hold water should be graded or filled to eliminate breeding sites. Precautions must be taken to prevent damage to areas designated as wetlands. Mow and remove grasses and brush to reduce resting sites.

b. Conducted by: Installation maintenance personnel.

2. Type: Biological, *Bacillus thuringiensis* Berliner variety *israelensis* (Bti) or *Bacillus sphaericus* (Bs).

a. Method and Location: Applied to sites that hold stagnant water longer than 7 days. When effective, no live mosquito larvae should be present 5 days after treatment. NOTE: This product is ineffective for controlling fourth instar larvae or pupae. Applications may be made at sites that are currently dry (pre-flood treatment) but have a history of mosquito problems when flooded. Larvae should be controlled for about to 30 days.

b. Conducted by: Certified pest control operators: DOD Category 8; SC Category 8

c. Pesticide: Bactimos Briquettes, or VectoLex CG (Bs)

d. EPA Registration Number 6218-47 (Bti) or 275-77 (Bs)

3. Type: Cultural.

a. Method and Location: Eliminate artificial breeding sites by removing items that can hold water such as bottles, cans, and discarded tires. Clean gutters to reduce standing water. Personnel should empty (weekly) or eliminate containers that hold water that may provide mosquito-breeding sites. Use yellow incandescent light bulbs and high-pressure sodium lights to reduce attracting mosquitoes.

b. Conducted by: Installation maintenance personnel.

B. Chemical.

1. Basis for Treatment:

ADULT MOSQUITOES

Corrective Threshold.

CDC Trap w/out CO2:	5 females/trap/night for nuisance biting mosquitoes 2 females/trap/night for disease vector control (note: this is not a very effective surveillance method)
CDC Trap with CO2:	25 females/trap/night for nuisance biting mosquitoes 5 females/trap/night for disease vector control

Human Complaints: validated by local light trap surveillance

LARVAL MOSQUITOES

Preventive Threshold. Treat known mosquito breeding sites (both permanent and semi-permanent) at the beginning and periodically throughout of the mosquito breeding season. Note: larvae continue to be active in breeding sites treated with an insect growth regulator (IGR). IGRs do not kill the larvae.

Corrective Threshold. Sites with 5 or more larvae per larval dip and not previously treated as above.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 8; SC Category 8

4. Pesticides: See Appendix D (Pesticide Use Proposal)

Personal Protective Measures

Insect Repellent 58007-1

5. Control Standard: Larval mosquitoes die before pupation. Materials are applied at all target sites per label directions. Note: Methoprene does not control late instar larvae, pupae, or adults. Adult mosquito control has been achieved when mosquito numbers in light traps are less than 25 female mosquitoes/trap/night level and/or incidence of mosquito-borne disease in humans has discontinued. NOTE: This may take additional treatments possibly combined with larvicide applications. Materials should be applied to all target sites per label directions. Insecticide sensitive cards can be used to assist in quality assurance.

IV. Precautions for Sensitive Areas: Do not apply aerosols when wind speeds exceed 5 miles per hour. Contact the MEDDAC, Preventive Medicine Service for a listing of pesticide sensitive individuals before applying ULV aerosols.

V. Prohibited Practices: Do not apply larvicides before heavy precipitation that may wash away insecticides. Read pesticide labels for additional prohibited practices.

VI. Environmental Concerns: These pesticides can harm honeybees. Do not damage or eliminate wetland ecosystems. For determining locations of wetland ecosystems refer to any natural resource or conservancy programs.

VII. Remarks:

A. Emphasis for mosquito control is placed on habitat reduction and the use of repellents. Chemical control is directed primarily at mosquito larvae.

B. If a mosquito-borne disease is detected in an area (found in mosquito populations or reported human cases) coordination for surveillance and control should be made with the USACHPPM South, Entomological Sciences Division, Fort McPherson, SC 30330, telephone number (404) 464-2564, and other federal (e.g., CDC), State, or local health agencies.

C. An equivalent insecticide must have the same active ingredient as identified in this plan and the target site must be on the product label.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 3

PEST: Ticks.

SITE: Outdoor areas.

I. Purpose: To control ticks to reduce the possibility of tick bites, which are irritating and may transmit a tick-borne disease such as Lyme disease, Rocky Mountain spotted fever, Southern Tick Associated Rash Illness (STARI), or Human monocytic ehrlichiosis.

II Surveillance.

A. Conducted by: Preventive Medicine personnel.

B. Methods: Tick drags, dry ice traps, and flagging. See TB Med 561 for additional information.

C. Frequency: Personal examination is performed twice daily while in tick habitats and again after returning from tick habitats. Surveys will be performed upon request in high-use areas such as outdoor class training and bivouac sites and other recreational sites, and upon complaints.

III. Pest Management Techniques.

A. Non-chemical

1. Type: Mechanical and Physical.

a. Method and Location: Wear proper clothing to prevent ticks from readily gaining access to the skin. Long pants should be worn and tucked in boot tops or socks. Whenever possible, use duct or similar tape to tape around the top of socks where they meet pants or blouse pants. Bivouac areas are raked clean of litter and tall grasses are cut short within a two-meter perimeter from tents and other inhabited areas. Whenever possible, grassy areas along the edge areas at ranges will be mowed as directed by Natural Resource staff or Facilities maintenance administrators.

b. Conducted by: Site users, particularly soldiers in the field.

2. Type: Cultural.

a. Method and Location: Control vegetation height by mowing or burning and remove leaf litter/undergrowth to reduce tick habitat. When a site has a high population of ticks present, an alternate site should be selected. All mowing and burning operations will be coordinated with the Natural Resources Office.

b. Conducted by: Site users. Facility operations personnel will conduct habitat modifications.

B. Chemical.

1. Basis for Treatment: **Corrective Threshold (only).**

Field Sites – average of 10 ticks per several (4 to 8) 100-yard tick drags

Family Housing Areas – 1 tick per single 100-yard tick drag or 4 ticks on a CO2 trap operated over a 1 hour period.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 7 (in and around buildings) & 8 (general public areas, such as parks); SC Category 7A (in and around all buildings), or 8 (general public areas, such as parks)

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: Tick populations shall be reduced within 7 days following treatment and few ticks found after 30 days following treatment and continued control throughout the tick season. No ticks should be found after 7 days from the treatment date for brown dog ticks within residences and other structures such as kennels for a period of 30 days.

IV. Precautions for Sensitive Areas: The treatment site must be vacant during treatment and until the applied insecticide has dried.

V. Prohibited Practices: Do not use repellents labeled for clothing application only on the skin. Use of pesticide for area control of ticks should be the last alternative selected for control since the pesticide kills other arthropods as well as ticks. Although the pesticide is labeled for outdoor sites, alternative locations should be selected and/or repellents used in lieu of chemical application to the ground.

VI. Environmental Concerns: See label directions.

VII. Remarks: The main emphasis for tick control is proper wearing of the uniform (or treated field clothing) and use of repellents. Live ticks may be collected during surveys and sent to USACHPPM-South, ATTN: ESD, 1312 Cobb ST SW, Fort McPherson, SC 30330-1075 for identification and tick-borne disease analysis. This work will be coordinated with USACHPPM-South (DSN 367-2564/2236) prior to the collection and shipment of ticks.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 4

PEST: Fire ants.

SITE: In/around buildings, maintained turf areas outside of buildings in the cantonment area, ranges and recreational areas.

I. Purpose: To reduce the incidence of fire ant envenomization.

II. Surveillance.

A. Conducted by: Primarily building occupants by visual observation. Pest management technicians in situations where professional assistance is needed (typically heavy infestations). Pest management QAEs may perform surveys for quality assurance of contractual pest management services. Preventive Medicine personnel may perform fire ants surveys based on complaints or during regular area surveys (i.e. Child Care Centers).

B. Methods: Visual observations of ants or mounds.

C. Frequency: Unplanned visual observations by building occupants. Pest management technicians perform surveys when services are requested. Pest management QAEs performs surveys as follow up after contract performance if complaints are received or as part of their quality assurance surveillance plan. Surveillance is usually done in conjunction with other maintenance on grassy areas.

III. Pest Management Techniques.

A. Non-chemical:

1. Type: Mechanical and Physical.

a. Method and Location: Exclusion is the primary method of control for building sites.

b. Conducted by: Maintenance personnel.

2. Type: Cultural.

a. Method and Location: Restoration of native tall grasses and forestation may reduce some fire ant populations.

b. Conducted by: Natural resources personnel.

B. Chemical.

1. Basis for Treatment: **Preventive Threshold:** sites having historical moderate to high infestations and having a high potential to adversely effect use of area for intended purpose. **Corrective Threshold:** use

broadcast treatment method when 5 or more colonies observed in a 50' by 50' area. Use spot treatment method when less than 5 colonies in the same area.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 3 (turf areas), 7 (in and around buildings) & 8 (community-wide control program); SC Category 3 (turf areas), 7A (in and around all buildings), or 8 (community-wide control program)

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standards: Visible reduction in mound activity should be observed within 2 to 5 weeks for baits and within 2 days for other pesticide formulations.

IV. Precautions for Sensitive Areas: IAW labeled instructions.

V. Prohibited Practices: As specified on pesticide label.

VI. Environmental Concerns: Do not apply baits to bodies of water or when wind speed exceeds 15 mph. Fire ant baits are not known to adversely affect reptiles or ground foraging birds.

VII. Remarks: Apply baits when fire ants are actively foraging. This is usually when the soil temperature is above 60°F and the ambient air temperature is 70-90°F. Do not apply baits if the grass is wet or if rainfall is expected within 3 hours. Do not irrigate baited areas for at least 3 hours. Mound drenching is performed in early morning hours or when the temperature is 65-80°F.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 5

PEST: Spiders.

SITE: In/around buildings and other structures.

I. Purpose: Eliminate spider populations in facilities and structures with special emphasis on poisonous species such as black widows, yellow sac spiders and brown recluse spiders.

II. Surveillance.

A. Conducted by: Building occupants and maintenance personnel. Pest management technicians only in rare situations where professional assistance is needed (i.e. black widow, yellow sac or brown recluse spiders present). Pest management QAEs may perform surveys for quality assurance of contractual pest management services.

B. Methods: Visual observation. Spiders are frequently found in dry, cool usually undisturbed places inside buildings; in carports, utility sheds and other outdoor storage areas; and under buildings. Use of sticky traps enhances surveys for yellow sac or brown recluse spiders.

C. Frequency: Unplanned visual observations by building occupants. Pest management technicians perform surveys when services are requested following self-help failure or when black widow, yellow sac or brown recluse spiders are suspected. Pest management QAEs performs surveys as follow up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

III. Pest Management Techniques.

A. Non-chemical.

1. Type: Mechanical and Physical.

a. Method and Location: Spiders and their webs can be eliminated by using a broom or vacuum cleaner in most cases. Maintenance of screens and weather-stripping around doors and windows will keep out small insects, which the spiders use for food. Exclude spiders by caulking cracks and crevices in building exteriors, maintaining tight fitting doors, and use tight fitting window screens. Control individual spiders outdoors by washing away webs with a hose. Sticky traps can be placed next to doorjambs to intercept incoming spiders (if it is suspected they are coming into the building from outside). The traps can also be used to determine if additional control efforts are needed, depending on the number and species of spiders caught.

b. Conducted by: Building occupants and possible janitorial services perform cleaning in most facilities. Maintenance personnel install, repair, or replace weather-stripping and screens.

2. Type: Cultural.

a. Method and Location: Spiders can be discouraged through good housekeeping, both inside and outside. Keep boxes, old equipment, and other items neatly stored on shelves, particularly in garages and basements; clean up and dispose of trash, debris, old equipment, etc.

b. Conducted by: Building occupants.

B. Chemical.

1. Basis for Treatment: **Corrective Threshold (only):** upon capture and identification of spider known to produce painful bites or determination of spider infestation. Do not treat for spiders based only upon complaints of "spider bites".

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 7; SC Category 7A

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: No evidence of spiders for 14 days after treatment.

IV. Precautions for Sensitive Areas: Do not apply pesticides on food, utensils, or food preparation surfaces.

V. Prohibited Practices: Do not let unauthorized personnel in treatment areas until applied materials have dried and vapor odors have subsided.

VI. Environmental Concerns: IAW labeled instructions.

VII. Remarks: Send spiders that are suspected of being medically important to USACHPPM-South, Entomological Sciences Division for identification if desired.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 6

PEST: German Cockroaches.

SITE: Family housing, dining facilities and other buildings.

I. Purpose: To control nymph and adult German cockroaches in family housing units, dining facilities and other buildings where people store and/or eat food on an occasional basis (e.g., break areas, coffee rooms, vending areas, etc.

II. Surveillance.

A. Conducted by: Housing occupants, building occupants (food service personnel), Preventive Medicine personnel and pest Management Technicians or Pest Management QAEs. Pest management QAEs performs surveys as follow up after contract performance.

B. Methods: Visual observation and sticky traps.

C. Frequency: Unplanned visual observations by building occupants. Sticky traps are used monthly in dining facilities and 1 to 2 weeks after chemical controls are applied to determine control effectiveness.

III. Pest Management Techniques.

A. Non-chemical.

1. Type: Mechanical and Physical.

a. Method and Location: Cockroach harborage is eliminated by using an elastomeric caulking (or filling with other materials) minor cracks, crevices, holes in walls and floors, or other areas where the structure has provided small openings which could be used by cockroaches. Sticky traps are used to control minor infestations of cockroaches in break areas or in other areas where food is eaten or stored. Vacuums may also be used to remove cockroaches and egg capsules from harborage sites.

b. Conducted by: Building occupants, Pest management technicians, and Preventive Medicine personnel

2. Type: Biological.

a. Method and Location: None available.

b. Conducted by: Not applicable.

3. Type: Cultural.

a. Method and Location: Good sanitation is practiced to reduce food and water used by cockroaches. Spilled food is cleaned up from work surfaces, walls, and floors. Dirty dishes and cooking containers are washed following use. Bags, boxes, and other potential harborage are removed from kitchens, storerooms, etc. Food is kept in sealed containers when not in use. Standing water is eliminated and leaking pipes are repaired promptly to minimize water availability to cockroaches. Break areas are kept clean and spilled food is cleaned up immediately. Food containers (e.g., soda cans, coffee cups, etc.) are rinsed out to reduce cockroach food.

b. Conducted by: Building occupants, food service personnel and maintenance personnel.

B. Chemical.

1. Basis for Treatment: **Preventive Threshold**. Government quarters during change of occupancy. For example, initial treatment only of vacant quarters with boric acid or other similar long-term residual product. **Corrective Threshold**. For Baiting: any observed level of active roach infestation. For Residual Spray: when an average of more than 5 roaches/trap/night using sticky traps is observed, treatment of entire area or enclosure is indicated. When a single trap has more than 5 roaches/trap/night using sticky traps, spot or localized treatment is indicated.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 7; SC Category 7A

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: Control should be established within two months and remain free of cockroaches for 30 days after treatment.

IV. Precautions for Sensitive Areas: Avoid human contact with cholinesterase inhibiting pesticides. Do not apply to areas where aquariums are present or where young infants may occupy. Areas to be treated with foggers should be properly prepared IAW labeled instructions.

V. Prohibited Practices: Do not apply pesticides on food items, utensils, or on food preparation surfaces. Do not let unauthorized personnel in treatment areas until applied materials have dried and vapor odors have subsided.

VI. Environmental Concerns: IAW labeled instructions.

VII. Remarks: As long as poor sanitation or harborage exists, the effectiveness of chemicals to control cockroaches may be limited. Pest control services should be withheld from personnel who do not implement good sanitation practices or do not properly prepare their facility for pesticide applications.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 7

PEST: Mice and Rats.

SITE: In and around all buildings to include family housing units, warehouses, and the commissary.

I. Purpose: Control mice and rats in buildings post wide to reduce the possibility of structural damage or contamination caused by mice or rats.

II. Surveillance.

A. Conducted by: Building occupants. Pest management technicians (in-house or contract) conduct surveys in response to service requests. Pest management QAEs may perform surveys for quality assurance of contractual pest management services.

B. Methods: Visual observation of damage and droppings. Surveys may include the use of rodent glue boards placed along perimeter walls.

C. Frequency: Unplanned visual observations by building occupants. Pest management technicians perform surveys when services are requested, during the performance of other pest control services (i.e. cockroach control in food handling buildings), or during specific surveys for mice. Pest management QAEs performs surveys as follow up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

III. Pest Management Techniques.

A. Non-chemical.

1. Type: Mechanical and Physical.

a. Method and Location: Openings greater than 1/4 inch at building exteriors are eliminated. Particular attention should be given to loading doors since they do not always close tightly. Windows and vents are tightly screened to prevent rodent entry. Snap traps and sticky glue boards may be used to capture mice or rats when an infestation is found. The suggested snap trap bait is peanut butter. Traps and glue boards will be checked daily.

b. Conducted by: Maintenance personnel perform building modifications such as weather stripping, door repair, etc. Building occupants may set snap traps or place glue boards for minor infestations. Pest management technicians set traps and glue boards when extensive trapping is required.

2. Type: Cultural.

a. Method and Location: Good sanitation is practiced to reduce food sources especially in food handling facilities and break rooms. Spilled food products are cleaned up immediately or daily at the latest. Waste receptacles are heavy plastic or metal with tight fitting lids. Water leaks and unnecessary standing water in and around buildings are eliminated promptly. Potential harborage is kept at a minimum. Excess bags, empty boxes, and other potential harborage are removed from food storage areas. Food items are stored on shelving which is at least 24 inches from walls and 12 inches above floors or on shelves with

rollers to permit routine cleaning, inspection, and rodent control. Vegetation around food handling buildings is kept cut at least 6 inches away from building perimeters.

b. Conducted by: Sanitation is performed by building occupants and maintenance personnel. Plumbing repair or replacement is conducted by facility maintenance staff. Vegetation control around buildings is performed by building occupants or grounds maintenance personnel or contractors.

B. Chemical.

1. Basis for Treatment: **Preventive Threshold.** Conditions exist for the infestation of rodents, especially sites having large quantity of stored foods, such as the Commissary and Post Exchange/Food Court. **Corrective Threshold.** Continued signs of rodent activity after maximizing use of nonchemical control methods, such as traps and rodent-proofing.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 7; SC Category 7A

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: Control shall be established within 30 days after treatment and remain free of mice/rats for an additional 30 days.

IV. Precautions for Sensitive Areas: IAW labeled instructions.

V. Prohibited Practices: Do not place rodenticides where the bait will be accessible to children or pets. Bait should be placed in tamper proof containers. Do not use rodenticides where there is a possibility of contaminating food or surfaces that come in direct contact with food.

VI. Environmental Concerns: Keep rodenticides out of lakes, streams, or ponds. Do not contaminate water by cleaning of equipment or disposal of wastes.

VII. Remarks: Exclusion is the preferred management method. As long as entry points into buildings exist, then trapping or baiting may be the only alternatives for control. Rodenticides will be placed in lockable bait stations. The presence of spilled food products and/or poor housekeeping (e.g., pallets against walls, old boxes and equipment kept in the warehouse, etc.) will adversely impact any baiting or trapping program. Building occupant cooperation to store items off the floors and away from the walls is critical in achieving effective rodent control in food handling areas.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 8

PEST: Snakes.

SITE: Cantonment area and training ranges.

I. Purpose: To control snake populations in high use areas and reduce the hazard of snakebite incidence or disruption of mission activities.

II. Surveillance.

A. Conducted by: Building occupants or maintenance personnel. Natural Resource personnel, facility management personnel, pest management technicians or local animal control officers, conduct surveys in response to service requests. Pest management QAEs may perform surveys for quality assurance of contractual pest management services.

B. Methods: Visual observation for live snakes and presence of favorable snake habitat, or possible entry points into structures.

C. Frequency: Unplanned visual observations by building occupants and maintenance personnel. Local natural resource personnel, pest management technicians, animal control officers, and Law enforcement officers perform surveys when services are requested or during the performance of other services. Pest management QAEs performs surveys as follow up after contract performance if complaints are received or as part of their quality assurance surveillance plan. Assistance from local Law enforcement or animal control officers is on an as needed basis.

III. Pest Management Techniques.

A. Non-chemical.

1. Type: Mechanical and Physical.

a. Method and Location:

(1) Exclusion by sealing entry points is performed. All openings around water pipes, electrical outlets, doors, and windows are closed. Holes in masonry foundations around structures are sealed with mortar. Hardware cloth (1/8th-inch) or sheet metal is also used to seal holes in wooden buildings or siding.

(2) Trapping snakes, which have taken up residence in or under buildings with rodent glue boards, is an effective method. Funnel traps constructed of 1/8th-inch hardware cloth used with drift fences may also be used to live trap snakes. Funnel traps are approximately 1 foot in diameter and about 4 feet long cylinders with an entrance funnel made of like material. Drift fences are made from 1/4- or 1/2-inch hardware cloth, which may have various lengths and is about 2 feet tall. The drift fencing is used to guide the snakes towards the funnel trap.

(3) Physical removal is made using a snake stick, tongs, or looped extension pole, or similar devices. Extreme care is taken when handling snakes to prevent accidental bites.

b. Conducted by: Building occupants or maintenance personnel perform exclusion work. Some exclusion work for specific sites may rarely be contracted. Live trapping or direct removal may be performed by experienced snake handlers, pest management technicians, local animal control officers, military police or local Law enforcement officers.

2. Type: Cultural.

a. Method and Location:

(1) Vegetation around structures is closely mowed. Brush, lumber and woodpiles, debris, rock piles, and other vegetation are removed.

(2) Avoidance - if at all possible must be attempted to bypass snakes. Snakes generally prefer to avoid people. Most encounters with snakes can be avoided by simply allowing the snake to leave the area. The biggest risk of snakebites comes from people going out of their way to handle or otherwise provoke snakes into a defensive attitude.

b. Conducted by: Habitat modifications may be performed by building occupants, site users. pest management technicians or grounds maintenance personnel. Avoidance must be practiced by all personnel encountering snakes.

B. Chemical.

1. Basis for Treatment: **Corrective Threshold (only).** Snake presence when building occupant(s) has excessive fear of snakes. Note: Treatment with a snake repellents is more to address the physiological duress of a building occupant than actual repellency provided by the product.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 7; SC Category 7A

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: This repellent is more for the psychological benefit of the customer than real repellency provided by the pesticide.

IV. Precautions for Sensitive Areas: Troops will be trained how to identify the possible species of poisonous snakes prior to using training areas.

V. Prohibited Practices: Non-poisonous snakes will not be harmed or killed. Venomous snakes are normally relocated and not killed but may be killed only in a dire emergency situation to prevent snakebite.

VI. Environmental Concerns: Snakes, both poisonous and nonpoisonous, will be captured alive and removed to a location where they will not cause any harm or disrupt post activities.

VII. Remarks: Personnel who are bitten by snakes will receive medical assistance immediately. Snakes should be avoided if at all possible. Captured snakes should be taken to remote areas of the installation and released. Snakes are regulated by the South Carolina Department of Natural Resources.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 9

PEST: Filth Flies.

SITE: Food service facilities, dumpsters/refuse containers and housing.

I. Purpose: To reduce potential of disease transmission and promote morale.

II. Surveillance.

A. Conducted by: Building occupants, food service personnel, Preventive Medicine personnel and pest controllers. Pest management QAEs may conduct surveys to determine control effectiveness achieved by contractual services.

B. Methods: Visual observation and fly grids. Sticky fly tape may be used by pest management technicians or pest management QAEs. Fly tapes are not placed directly over stored food or over food preparation surfaces.

C. Frequency: Daily observation during period March through October by building occupants. Pest management technicians perform surveys when services are requested. Pest management QAEs performs fly surveys after receiving complaints about contract performance or as random sampling.

III. Pest Management Techniques.

A. Non-chemical.

1. Type: Mechanical and Physical.

a. Method and Location: Proper sanitation, screening trapping using sticky flytraps and reduction of harborage/breeding areas. Sticky flytraps may be used to control minor infestations in areas, which are not directly over prepared food or food preparation surfaces. Fly grids designed to stun and capture flies on a sticky surface may be used in kitchen and eating areas (as opposed to older fly grids, which are designed to electrocute flies causing them to explode and fragment). Screens should be used to preclude fly entry when doors and windows are to be left open. Automatic self-closing devices should be placed on outer doors to reduce the time open doors permit fly entry. Air curtains may also be used at entry points, but must be installed and maintained correctly to blow flies away from the entrance and not into the entrance and should cover the entire door width. Fly swatters can also be used with care so not to contaminate food, utensils, and food preparation surfaces.

b. Conducted by: Food service personnel, building occupants and maintenance personnel. Install, repair, and replace screens, doors, door closing devices, air curtains, and electric fly grids. Keeping doors closed when not in use and the use of fly swatters is the responsibility of building occupants.

2. Type: Cultural.

a. Method and Location: Use good sanitation to reduce food and water sources, which attract flies. Clean up spilled food from work surfaces, walls and floors. Wash dirty dishes and cooking containers following use. Do not leave exposed food in the facility overnight. Place garbage in sealable bags. Place the bags in containers with tight fitting lids and keep containers closed when not in use. Do not place dumpsters within 50 feet of the facility. Dumpsters with putrescible materials are emptied and cleaned weekly during the fly breeding season.

b. Conducted by: Food service personnel and building occupants. Dumpsters are emptied and cleaned by facility maintenance staff or contractors.

B. Chemical.

1. Basis for Treatment: **Corrective Threshold (only):** sustained moderate to heavy filth fly infestations after maximizing use of non-chemical control methods. Note: No chemical control for filth fly maggots.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 7; SC Category 7A

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: Flies killed on contact using space treatment. Moderate to heavy fly infestations are reduced to light infestation for 7 days following residual or bait applications.

IV. Precautions for Sensitive Areas: No unauthorized personnel are allowed in areas, which receive space treatment. See pesticide label for precautions.

V. Prohibited Practices: Do not apply pesticides on food items, utensils, or on food preparation surfaces.

VI. Environmental Concerns: IAW labeled instructions.

VII. Remarks: Sanitation is essential to filth fly control. Good sanitation should virtually eliminate fly problems at most building sites. Special emphasis should be on food preparation/storage areas and refuse disposal. If flies are coming into the facility from a nearby source (e.g., farm, dump, etc.), then facility management personnel would be notified to look into the problem.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 10

PEST: Other Vertebrate Pests (Feral/stray dogs and cats, raccoons, squirrels, etc.).

SITE: Cantonment area. Primary sites are at all buildings and associated surroundings; however, control may be required in training areas.

I. Purpose: To remove nuisance animals in or under buildings, reduce the possibility of animal bites and exposure to rabies, occurrence of flea infestations, odor problems, and damage from burrowing and foraging.

II. Surveillance.

A. Conducted by: Building occupants or maintenance personnel. Facility management personnel, pest management technicians, animal control officers, military police or local Law enforcement officers may conduct surveys in response to service requests. Pest management QAEs may perform surveys for quality assurance of contractual pest management services.

B. Methods: Visual observation for live animals, tracks, and sign of damage, burrows, and scat and odor detection.

C. Frequency: Unplanned visual observations by building occupants and maintenance personnel. Natural Resource personnel, pest management technicians, local animal control, or Law enforcement officers perform surveys when services are requested or during the performance of other work functions. Pest management QAEs performs surveys as follow up after contract performance if complaints are received or as part of their quality assurance surveillance plan. Assistance from local animal control or Law enforcement officers is on an as needed basis.

III. Pest Management Techniques.

A. Non-chemical.

1. Type: Mechanical and Physical.

a. Method and Location:

(1) Live traps (wire, barrel, or wood box traps) are normally used. Live traps are baited with fish, pet food, chicken parts, bacon, peanut butter or fruits. Use to leg-hold traps and shooting requires the permission of local law enforcement officers.

(2) Exclusion from buildings is also conducted by installing hardware cloth, sheet metal, or other materials around structures and vents. Existing burrows are filled in during control operations.

b. Conducted by: Building occupants or maintenance personnel perform exclusion work. Live trapping may be performed by maintenance personnel, pest management technicians, military police local animal control officers, or local game enforcement officers.

2. Type: Cultural.

a. Method and Location: Sanitation practices are used which includes removing trash that attracts vertebrate pests and using tight fitting lids on trash receptacles. Feeding of stray or wild animals is prohibited. Sources of shelter around buildings such as unnecessary brush piles, stacked lumber, woodpiles, etc. are eliminated to discourage the presence of animals.

b. Conducted by: Building occupants or maintenance personnel.

B. Chemical. (None for all 4-legged vertebrate animals except squirrels)

1. Basis for Treatment: **Corrective Threshold (only):** Observation of squirrels in and around buildings initiates control efforts. No chemical control for other vertebrate species.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 7; SC Category 7A

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard. Squirrels stop using site for at least 14 days following application of the repellent paste.

IV. Precautions for Sensitive Areas: None.

V. Prohibited Practices: Attracting these animals by the deliberate feeding of stray or wild animals around buildings is prohibited.

VI. Environmental Concerns: None.

VII. Remarks: Wild animals (other vertebrate pests addressed in this section) are to be euthanized and not released. Live captured animals are taken to the Veterinary Clinic. All personnel who perform trapping for these animals should receive rabies prophylaxis. Heavy-duty leather gloves are worn whenever handling live traps and animals. Coordination with local health or animal control officials will be made to determine if rabies examinations of these animals are necessary when they are suspected of having rabies (acting sick, signs of aggression, or very nervous activity). Any of these animals that have caused bites or scratches are submitted to the state health department for rabies examination. All bites or scratches from these animals are reported to the local medical authority. Areas under buildings where these animals were removed are treated for fleas when fleas are observed or suspected.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 11

PEST: Scorpions.

SITE: In and around Family Housing and other post buildings.

I. Purpose: To eliminate scorpions from family housing units and other post buildings.

II. Surveillance.

A. Conducted by: Housing occupants.

B. Methods: Visual observation.

C. Frequency: Unplanned visual observations by building occupants.

III. Pest Management Techniques.

A. Non-chemical.

1. Type: Mechanical and Physical.

a. Method and Location: Exclusion practices and insect sticky traps.

b. Conducted by: Housing occupants.

2. Cultural.

a. Method and Location: Remove scrap wood, limbs and other debris form around housing unit. Do not store canvas, tarps or tentage in contact with the ground. Controlled burning is an effective tool to remove habitat in wooded areas adjacent to housing units.

b. Conducted by: Roads and Grounds personnel.

B. Chemical.

1. Basis for Treatment: **Corrective Threshold:** observation of scorpions initiates control efforts.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 7; SC Category 7A

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: No live scorpions for 30 days following treatment.

IV. Precautions for Sensitive Areas: IAW labeled instructions.

V. Prohibited Practices: IAW labeled instructions.

VI. Environmental Concerns: IAW labeled instructions.

VII. Remarks: None.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 12

PEST: Fleas.

SITE: In and around buildings, housing units, and other structural facilities where pets or feral animals live.

I. Purpose: To control fleas, which are biting humans in buildings, housing units, and areas where feral animals and pets live. To prevent severe itching and secondary skin infections that can result from fleabites.

II. Surveillance.

A. Conducted by: Occupants or pest controllers. Pest management QAEs may perform surveys for quality assurance of contractual pest management services.

B. Methods: Visual observation of fleas or flea bites and traps. Flea traps (commercially available or made following guidance in TB Medical 561, Chapter 7). Surveys include looking for possible hosts such as stray cats or wild animals in the area.

C. Frequency: Unplanned visual observations by building occupants. Pest management technicians perform surveys when services are requested. Pest management QAEs perform surveys as follow up after contract performance if complaints are received or as part of their quality assurance surveillance plan. Normally during the period April through October.

III. Pest Management Techniques.

A. Non-chemical. NOTE: Non-chemical controls are the primary methods used and pesticides are used only to supplement control efforts when necessary.

1. Type: Mechanical and Physical.

a. Method and Location: Vacuuming carpets and upholstered furniture will help to control fleas - be sure to empty the cleaner bag immediately after vacuuming since the fleas which have been removed are usually not killed. Host animals are removed and excluded from buildings. Access doors and vents to building crawl areas will be maintained in good repair to prevent flea host (i.e. cats, skunks, etc.) entry to under structures. Restrict pets' access to interior living areas. Live trapping will be performed to remove feral animals from structures.

b. Conducted by: Occupants or janitorial services are responsible for vacuuming. Facility maintenance personnel are responsible for all structural maintenance and repairs.

2. Type: Biological.

a. Method and Location: Not performed.

b. Conducted by:

3. Type: Cultural.

a. Method and Location: Wash pet bedding frequently. Normal washing and drying with a typical commercial detergent is sufficient to kill/control fleas in pet bedding. Stray dogs and cats will not be encouraged to be in the area by deliberate feeding or by poor sanitation. Refuse receptacles have tight-fitting lids, which prevent potential fleas hosts access to food.

b. Conducted by: Building occupants.

B. Chemical.

1. Basis for Treatment: **Corrective Threshold (only):** for general post buildings, the presence of any active flea infestation and collection of at least one flea initiates control efforts, not bites from unknown origins. For family quarters with pets, only an initial flea treatment will be provided, subsequent treatments will be self-help at occupant's expense.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 7; SC Category 7A

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: No live fleas 14 days following treatment.

IV. Precautions for Sensitive Areas: Building should be evacuated when using foggers. Do not contaminate food, feed, food preparation surfaces, or utensils.

V. Prohibited Practices: Do not permit unauthorized personnel in treatment areas until applied materials have dried and vapor odors have subsided.

VI. Environmental Concerns: Do not apply pesticides directly to water or when runoff is likely.

VII. Remarks: Fleas can be a problem in buildings with feral cats or other wild animals such as skunks or raccoons living under them. Adult fleas may enter the first floors of the buildings through small cracks or other openings and subsequently bite people working inside. For this reason host removal and exclusion must also be performed.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 13

PEST: Subterranean Termites.

SITE: All wood structures and new construction.

I. Purpose: To prevent and/or reduce damage to wood structures and cellulose containing materials such as lumber, stored pallets, and cardboard boxes.

II. Surveillance.

A. Conducted by: Incidental surveys are conducted by building occupants who may discover termite damage or termite swarms at the work site. Certified pest management technicians (in-house or contracted) are the primary surveys for termites. Certified pest management QAEs perform 100% inspection of all contracted termite control operations. All termite inspections shall be documented on a Termite Inspection and Treatment form (Appendix T).

B. Methods: Visual observation for termites (swarms), termite tubes, termite damage, frass or conditions that could favor termite infestations. Inspections performed by pest management technicians are recorded on floor plans drawn to scale, which indicate the locations of infestations, damage, and favorable conditions for termite infestations.

C. Frequency: Termite inspections are conducted biennially during fall and winter months at all buildings constructed with wood. These inspections may be performed as specific termite inspections or performed in conjunction with services for other pests. Additional inspections are performed when termite damage or swarms are reported and prior to major construction rehabilitation projects that involve new additions or floor work at grade level. Pest management QAEs perform surveys also as follow up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

III. Pest Management Techniques

A. Non-chemical Techniques.

1. Type: Mechanical and Physical.

a. Method and Location: Reduce or eliminate moisture sources beneath wood structures that encourage termite colonies. Examples include leaking pipes under buildings, dripping faucets, and incorrect drainage away from buildings. Crawl spaces are well ventilated. Infested material is repaired or replaced. Vegetation next to foundations, which impairs inspection for termite tubes, is discouraged and cut or removed. Termite shields are used during building construction. Termite tubes are removed when discovered. Waste lumber is removed from construction sites prior to final grading. Tree and large shrub stumps located near buildings are removed so not to attract termites. Soil at grade level is removed when found within 4 inches of wooden structural elements to eliminate earth to wood contact.

Expansion joints in concrete floors and around plumbing, which penetrates slabs, are sealed with an elastomeric sealant.

b. Conducted by: Building occupants, facility operations, or contractors perform mechanical and physical controls.

2. Type: Cultural.

a. Method and Location: Remove scrap wood and debris under and around structures. Lumber, pallets, and other cellulose containing materials are not stored directly on the ground or against siding.

b. Conducted by: Building occupants, maintenance personnel, or contractors.

B. Chemical.

1. Basis for Treatment: **Preventive Threshold:** all new construction projects for buildings receive pre-construction treatment in the soil. Structures not previous treated which are receiving rehabilitation work that includes additions or new floor work will be treated. **Corrective Threshold:** all active termite infestations in structures are treated that are observed based upon swarming activity or building inspections. Spot treatments are permitted only in those structures that have a history of previous termite treatment or building shows signs that structure was treated, such as drill holes.

2. Method and Location: New construction sites are treated by broadcasting and trenching the insecticide per label directions. Injection and horizontal rodding is used only with post-construction treatment. Barrier treatment along foundations, around support beams, and along piers are trenched and not rodded to provide a more even distribution of insecticide. Soil injection may require drilling through existing slabs, as directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 7; SC Category 7A

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standards: No subsequent termite infestations or damage from treated structures for five years after application. Structural modifications made such as drilling holes, cutting tiles or linoleum, and installing bath trap access panels are repaired or replaced to match existing adjacent surfaces in quality and finish. All debris, including dust, caused by drilling or other work is removed from the treatment site.

IV. Precautions for Sensitive Areas: No chemical treatment will be accomplished when sub-slab or inter-slab air ducts exist. Avoid getting pesticide in areas where water can become contaminated, and in air ducts of buildings. Do not allow unauthorized personnel in the treatment area during termiticide application until the termiticide has dried and vapor odors have subsided.

V. Prohibited Practices: Do not treat soils too wet to accept the termiticide.

VI. Environmental Concerns: IAW labeled instructions.

VII. Remarks: Records of inspections and treatment will be kept for the life of the building. Coordination is made with the Corps of Engineers and Facility Operations to ensure that all specifications for new construction and rehabilitation projects involve proper termite protection materials and techniques and quality assurance will be performed on all contracted termite control projects. All treatment operations involve placing a termite treatment notification sign, which legibly states the termiticide used, treatment date, and applicators name (and company name for contractors) in the interior of the circuit breaker box.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 14

PEST: Carpenter Ants.

SITE: In and around wooden structures or buildings.

I. Purpose: Reduce/eliminate damage to wooden structural elements caused by these pests.

II. Surveillance.

A. Conducted by: Visual observation by building occupants. Pest management technicians conduct a survey in response to service requests. Pest management QAEs perform surveys for quality assurance of contractual pest management services.

B. Methods: Visual observation.

C. Frequency: Unplanned visual observations by building occupants. Surveys are done by professional pest management technicians in conjunction with termite inspections or as necessary following complaints. Pest management QAEs performs surveys as follow up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

III. Pest Management Techniques.

A. Non-chemical.

1. Mechanical and Physical.

a. Method and Location: Remove and replace damaged wood. Reduce or eliminate moisture under and around wood structures by correcting drainage problems and improving ventilation.

b. Conducted by: Maintenance personnel.

2. Cultural.

a. Method and Location: Do not place firewood or other wood against the outside of the building. Remove scrap wood and other debris from around wooden structures. Trim trees or shrubs to prevent contact with structures.

b. Conducted by: Building occupants.

B. Chemical.

1. Basis for Treatment: **Corrective Threshold (only):** observation of carpenter ants initiates control efforts.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 7; SC Category 7A

4. Pesticides :

5. Control Standards: No visible live ants indoors for 30 days following treatment.

IV. Precautions for Sensitive Areas: Do not contaminate food, utensils, food containers, food preparation areas, or water.

V. Prohibited Practices: Do not let unauthorized personnel in treatment areas until applied materials have dried and vapor odors have subsided.

VI. Environmental Concerns: None.

VII. Remarks: Carpenter ants are normally a rare problem.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 15

PEST: Birds (only starlings, house sparrows, pigeons , and nuisance resident waterfowl with the appropriate permits/coordination).

Commented [DM3]: What about nuisance resident waterfowl like Canada Geese? Should they be included in this plan?

SITE: Buildings, other structures, golf courses, and ponds in the cantonment area.

I. Purpose: To control roosting birds (house sparrows, starlings and pigeons) to prevent damage/contamination from droppings and/or ectoparasites. To control resident waterfowl (especially resident Canada Geese) numbers to prevent contamination from droppings, reduce risk of outbreaks of waterfowl diseases, reduce damage to turf and other vegetation, and reduce the risk of bird/aircraft collisions near helicopter landing zones.

II. Surveillance.

A. Conducted by: Building occupants, natural resources personnel (for resident waterfowl), or maintenance personnel. Pest management technicians conduct surveys in response to service requests. Pest management QAEs may perform surveys for quality assurance of contractual pest management services.

B. Methods: Visual observation for birds, droppings, or nests.

C. Frequency: Unplanned visual observations by building occupants and maintenance personnel. Pest management technicians and natural resources personnel (for resident waterfowl) perform surveys when services are requested, during the performance of other pest control services or during specific surveys for birds. Pest management QAEs performs surveys as follow up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

III. Pest Management Techniques.

A. Non-chemical.

1. Type: Mechanical and Physical.

a. Method and Location:

(1) Implement exclusionary tactics to prevent access to roosting areas. Some methods include using bird netting, distress call pest repellers and spring-tensioned wire systems, or nixalite needle strips.

(2) Habitat modifications, which exclude birds from buildings, are the primary pest management technique practiced. Proper design in construction is considered to minimize bird harborage or access to buildings. Exclusion devices include screens, netting, and high tension using stainless steel posts and spring-tensioned wires are the accepted methods of exclusion.

(3) Trapping is the preferred method of for reducing pest bird populations at a specific site or area. Funnel traps work for capturing starlings and house sparrows. Bob-type traps are used when controlling pigeons. Advantages of trapping include: the number of birds removed is known, protected bird species are released unharmed, controlled birds stay at the control site; whereas poisoned or sickened birds may fly away, and time is not required to pick up dead birds if toxicants were used. Trapped target birds are humanly killed or provided to a raptor center, licensed falconers, or bird dog trainers. Resident Canada Geese are corralled on pond shorelines during the birds molting period. Resident Canada Geese are either euthanized or relocated to an area off post as designated by the S.C. Department of Natural Resources (SCDNR), U.S. Fish and Wildlife Service, and the USDA- Animal & Plant Health Inspection Service-Wildlife Services Division (APHIS).

(4) Nest destruction in buildings is performed during the nesting season. This method is usually done in conjunction with other control methods.

(5) Shooting in and around structures with a pellet gun at night is an effective method used to control small populations. Because shooting may be hazardous and labor intensive it is rarely used. Night shooting is practiced because fewer people are typically in the control area and birds are found at roost sites. Shooting resident waterfowl can be performed by licensed hunters during annually established waterfowl hunting seasons.

b. Conducted by: Building occupants and maintenance personnel perform exclusion work. Some exclusion work for specific sites may be contracted. Trapping, nest destruction, and shooting is performed by pest management technicians. Trapping operations are coordinated with local health department officials in surrounding communities to initiate controls where pest birds are coming from locations outside the installation. Resident waterfowl trapping must be coordinated with the U.S. Fish and Wildlife Service, the SCDNR and APHIS.

Commented [DM4]: This is an "odd" sentence. What are we trying to say here?

2. Type: Cultural.

a. Method and Location: Eliminate food and water sources such as bird feeders near roosting areas. Loading doors and unscreened windows or other openings should be kept closed when not in use. People should be discouraged from feeding birds, especially pigeons. Frequent mowing of grass may discourage resident Canada Geese from feeding in a specific area, although not effective on golf courses. Also, the use of trained dogs to harass resident Canada Geese from specific areas can be effective, but often costly.

b. Conducted by: Building occupants and grounds maintenance personnel.

B. Chemical.

1. Basis for Treatment: **Corrective Threshold (only):** active infestation of starlings, pigeons or sparrows in site(s) not conducive with human activity where non-chemical controls are delayed or impractical. Control of any other bird species must be coordinated with the U. S. Fish & Wildlife Service.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 7; SC Category 7A

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: Birds no longer return to the area 7 days after treatment.

IV. Precautions for Sensitive Area: Shooting activity is coordinated with local law enforcement officials.

V. Prohibited Practices: Inhumane treatment of captured birds.

VI. Environmental Concerns: Protected bird species are released unharmed from traps.

VII. Remarks: Ectoparasite control may be necessary where bird nesting occurred. Additional information on bird control may be found at: http://www.birdbarrier.com/

INTEGRATED PEST MANAGEMENT OUTLINE NO. 16

PEST: Stored Products Pests.

SITE: Food storage and handling areas to include dining facilities, Commissary and Post Exchange.

I. Purpose: To control insects, which damage food and fiber products.

II. Surveillance.

A. Conducted by: Primarily facility personnel. Veterinary Activity personnel monitor food items delivered to the Commissary and food service facilities. Pest management and veterinary service personnel conduct surveys based on requests if stored product pests are suspected. Pest management QAEs may conduct surveys to determine control effectiveness achieved by contractual services.

B. Methods: Visual observations for insects or conditions that could favor insect infestations in stored food products. Particular attention shall be given to rodent bait stations when they are in use since most baits are subject to insect infestation. Visual observations may be enhanced by using sticky traps for detecting crawling insects or using species-specific pheromone traps.

C. Frequency: Not less than monthly in food service facilities and weekly in commissary and warehouses. Pest management technicians conduct surveys based on service requests. Pest management QAEs conduct surveys based on complaints about contractor performance and by random sampling.

III. Pest Management Techniques.

A. Non-chemical.

1. Type: Mechanical and Physical.

a. Method and Location: Proper storage of food products such as segregation of foods and wide walkways between rows. Clean up spilled food materials, which may attract and provide a food source for insects at least daily. Vacuuming is encouraged to remove insects and food spillage. Exclusion practices such as sealing cracks, crevices and other openings is implemented to reduce harborage and to aid in food spillage removal.

b. Conducted by: Building occupants and maintenance personnel.

2. Type: Cultural.

a. Method and Location: Sanitation practices such, as sweeping and vacuuming should be accomplished frequently. Containerize damaged goods immediately to

prevent infestation. All infested products will be removed immediately upon discovery. Store food products in walk-in coolers when possible.

b. Conducted by: Food service personnel.

B. Chemical.

1. Basis for Treatment: **Corrective Threshold (only).** Use residual treatment around any site where any active infestation occurs. Use Ultra Low Dose (ULD) treatment where continued infestation occurs and can spread throughout the facility and is validated by use of phermone traps.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 7; SC Category 7A

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: No live insects observed for 30 days following residual treatments. No adults observed for 24 hours following space treatment.

IV. Precautions for Sensitive Areas: IAW Labeled instructions.

V. Prohibited Practices: Do not apply pesticides on food, utensils, food containers, or food preparation surfaces. Do not let unauthorized personnel in treatment areas until applied materials have dried and vapor odors have subsided.

VI. Environmental Concerns: IAW labeled instructions.

VII. Remarks: Suspected unidentified specimens should be sent to: U.S. Army Center for Health Promotion and Preventive Medicine – South (USACHPPM-South), Entomological Sciences Division, 1312 Cobb ST SW, Fort McPherson, Georgia 30330-1075 for identification.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 17

PEST: All Vegetation (Bare ground).

SITE: Sidewalks, curbs, gutters, parking lots, fence lines, wildlife food plots, utility poles, traffic and parking signs, hydrant bases, around building foundations, industrial sites, electrical transformers and air conditioning units and railroad tracks.

I. Purpose: To control unwanted vegetation, which is unsightly and/or causes damage or competing with native or planted vegetation in wildlife food plots and openings, reduce risk of fires and security reasons. Use of vegetation control around food handling buildings also aids in rodent control.

II. Surveillance.

A. Conducted by: Building occupants, maintenance personnel, and natural resources managers. Pest management technicians conduct surveys in response to service requests. Pest management QAEs may perform surveys for quality assurance of contractual pest management services.

B. Methods: Visual observation.

C. Frequency: Unplanned visual observations by building occupants and maintenance personnel. Maintenance personnel, natural resources managers, and pest management technicians perform surveys when services are requested, during the performance of other grounds maintenance services (i.e. mowing, etc.), or during specific surveys for weeds. Surveys may include observations conducted during the previous or current growing season to determine the need for control measures. Pest management QAEs perform surveys as follow up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

III. Pest Management Techniques.

A. Non-chemical.

1. Type: Mechanical and Physical.

a. Method and Location: Mechanical vegetation removal may be selected by using shovels, hoes, or string trimmers. Care is exercised to not damage root systems or bark at the base of desirable plants. Mechanical control methods can be used, but are very labor-intensive and often short term. Mechanical control may also be performed with other maintenance equipment such as mowers, disk harrows, graders and backhoes when used in conjunction with other operations (i.e. road grading or ditch cleaning). Use of elastomeric caulking in cracks and crevices in sidewalks and other pavement is encouraged.

b. Conducted by: Building occupants, natural resources managers, and maintenance personnel.

2. Type: Cultural.

a. Method and Location: Use of mulches (organic and synthetic) is encouraged to provide total vegetation control. Sites to be mulched include around desirable vegetation such as trees and shrubs and along fencelines.

b. Conducted by: Grounds maintenance personnel.

B. Chemical.

1. Basis for Treatment: **Preventive Threshold:** high potential for weed growth in sites requiring a bare ground appearance using pre-emergent herbicide. **Corrective Threshold:** actual weed growth observation using post-emergent herbicide.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 6; SC Category 6

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: Vegetation is killed within 3 to 14 days after treatment. Pre-emergent treatments prevent weed growth for at least 90 days.

IV. Precautions for Sensitive Areas: Avoid contact with foliage of desirable vegetation. Do not apply within the root zone of desirable vegetation. Avoid direct application to any body of water. Avoid drift, which could damage desirable plants.

V. Prohibited Practices: Do not apply herbicides if precipitation is anticipated within 6 hours. Rainfall within this period can severely reduce effectiveness.

VI. Environmental Concerns: Do not apply herbicides directly to water or wetland ecosystems. Do not contaminate water when disposing of equipment rinse water.

VII. Remarks: Mechanical methods are labor intensive, costly and do not provide long-term results. Glyphosate causes eye irritation and is harmful if swallowed. It may also cause skin irritation. Wear chemical-resistant gloves and goggles.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 18

PEST: Broadleaf weeds.

Commented [DM5]: Need to somewhere include the control of undesirable broadleaf weeds in wildlife food plots.

SITE: Intensively managed grassy areas within the cantonment area, parade and athletic fields and lawns, and wildlife food plots.

I. Purpose: To eliminate broadleaf competition with desired grasses.

II. Surveillance.

A. Conducted by: Building occupants or maintenance personnel. Pest management technicians conduct surveys in response to service requests. Natural resources personnel conduct surveys of wildlife food plots. Pest management QAEs may perform surveys for quality assurance of contractual pest management services.

B. Methods: Visual observations for undesirable broadleaf weeds in turf and wildlife food plots.

C. Frequency: Unplanned visual observations by building occupants and maintenance. Pest management technicians perform surveys when services are requested, during the performance of other grounds maintenance work (i.e. mowing, etc.), or during specific surveys for weeds. Surveys may include observations conducted during the previous growing season to determine if preemergent herbicides are necessary. Pest management QAEs perform surveys as follow up after contract performance if complaints are received or as part of their quality assurance surveillance plan. Surveys to determine the need for preemergent herbicides to control summer broadleaf weeds are conducted May - July the previous year. Surveys to determine the need for postemergent herbicides to control summer broadleaf weeds are conducted May - July the current year. Surveys to determine the need for preemergent herbicides to control winter broadleaf weeds are conducted November - February the previous year. Surveys to determine the need for postemergent herbicides to control winter broadleaf weeds are conducted November - February the current year.

III. Pest Management Techniques.

A. Non-chemical.

1. Type: Mechanical and Physical.

a. Method and Location:

(1) Proper mowing involves cutting desirable grasses at the recommended height and often enough to prevent scalping. This means removing no more than 1/3 of the total leaf surface in a mowing. Raising the mowing height during periods of stress helps maintain turf vigor. Mowing grass to maintain a uniform height generally does not eliminate broadleaf weeds but may provide acceptable control for a short period of time.

Burning will provide some reduction in broadleaf populations. Frequent disking or cultivation of food plots may prevent the maturation of certain undesirable broadleaf species in food plots.

(2) Mechanical broadleaf weed removal may be selected by using shovels or hoes. Care is exercised to not damage root systems of desirable plants.

b. Conducted by: Building occupants, natural resource managers, and Roads and Grounds personnel.

2. Type: Cultural.

a. Method and Location:

(1) Turfgrass selection is the most important factor in developing and maintaining a high quality, problem-free turf. Turfgrass selection is based on the environment, expected turf use, and expected management intensity. Certified seed or sprigs are used.

(2) Proper fertilization of grassy areas promotes favorable grass growth. Soil analysis of selected turf areas may be made to determine proper fertilization rates.

(3) Turfgrass watering needs depend on grass species, turf maintenance level, soil type, and weather. Most turfgrasses require one inch of water per week during active growth. Irrigating after sunset and before sunrise is the most efficient and effective time to irrigate and will not increase disease problems.

(4) Liming of selected areas may be applied according to soil test recommendations.

(5) Common cultivation practices include coring, spiking, and vertical mowing. Coring is the best method to reduce soil compaction and improve water infiltration. Coring is most effective using hollow or spoon-type tines, which remove plugs of soil two to three inches, and one-half to three-fourths inch in diameter. Fertilization 10 to 14 days before cultivation increases the turf recovery rate.

b. Conducted by: Building occupants and Roads and Grounds personnel.

B. Chemical.

1. Basis for Treatment: **Preventive Threshold:** high potential for broadleaf weed growth in managed turf sites and wildlife food plots using pre-emergent herbicide. **Corrective Threshold:** actual observation of weeds using post-emergent herbicide.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 3; SC Category 3

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: Broadleaf weeds should be killed within 10 to 14 days after treatment. Pre-emergent treatments should prevent broadleaf weed growth for 60 days.

IV. Precautions for Sensitive Areas: See the pesticide label for precautions. Do not allow personnel on treated areas until after sprays have dried.

V. Prohibited Practices: None.

VI. Environmental Concerns: Do not apply herbicides when winds may create undesirable drift.

VII. Remarks: Good turf management practices, which involve mechanical and cultural control, are essential in establishing and maintaining healthy turf, which resists invasion by broadleaf weeds.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 19

PEST: Grasses.

Commented [DM6]: Need to address the need to control grasses in wildlife food plots.

SITE: Parade fields, lawns, other common turf areas, and wildlife food plots.

I. Purpose: To improve aesthetics and usability of parade fields. Grass control may also be necessary to improve security along fence lines and reduce fire hazards at fuel sites or electrical stations. Control of grasses may be warranted in maintaining desirable plantings in wildlife food plots or when restoring native vegetation in wildlife management areas.

II. Surveillance.

A. Conducted by: Building occupants may incidentally observe turf problems. Surveys are performed by grounds maintenance personnel and natural resource managers. Grounds maintenance personnel may conduct surveys in response to service requests. Pest management or Grounds maintenance QAEs may inspect for quality assurance of contractual pest management services.

B. Methods: Inspections for undesirable grasses in turf and wildlife food plots or native vegetation restoration sites.

C. Frequency: Inspections are conducted by grounds maintenance personnel and natural resource managers. Personnel inspect when requested, during other grounds maintenance services (e.g., mowing), or during specific surveys for weeds. Inspections conducted during the previous growing season may determine if pre-emergent herbicides are necessary. Pest management or grounds maintenance QAEs inspect after contracted work if complaints are received or as part of their quality assurance surveillance plan. Surveys to determine the need for pre-emergent herbicides are generally conducted May- August the previous year. Post-emergent herbicide surveys are conducted April- September during the current year.

III. Pest Management Techniques.

A. Non-chemical. NOTE: Pesticides are used only to supplement non-chemical control methods when they are unsuccessful.

1. Type: Mechanical and Physical. Mechanical control facilitates chemical control by breaking down leaf surface repellency and therefore less herbicide needs to be applied.

a. Method and Location:

(1) Cut grasses at the recommended height. This means removing no more than 1/3 of the total leaf surface. Raise the mowing height during periods of drought to maintain turf vigor. String trimmers are also used. Care is taken when using string trimmers to not damage the bark of trees and shrubs.

(2) Use shovels and hoes to remove grass in specific spots. Avoid damaging root systems of desirable plants.

b. Conducted by: Building occupants, contractors, or grounds maintenance personnel.

2. Type: Cultural.

a. Method and Location:

(1) Turf selection is most important in developing and maintaining a high quality, problem-free turf. Turf selection is based on the environment, expected turf use, and expected management intensity. Use certified seed or sprigs.

(2) Proper fertilization of grassy areas promotes favorable grass growth. Soil analysis of selected turf areas may be made to determine proper fertilization rates.

(3) Turf irrigation requirements depend on grass species, turf maintenance level, soil type, and weather. Most turf require one inch of water per week. Irrigate after sunset and before mid-morning.

(4) Apply lime to selected areas according to soil test recommendations.

(5) Common cultivation practices include coring, spiking, and vertical mowing. Coring is the best aeration method to reduce soil compaction and improve water infiltration. Coring is most effective using hollow or spoon-type tines that remove plugs of soil 2 to three inches and one-half to three-fourths inch in diameter. Fertilization 10 to 14 days before cultivation increases the turf recovery rate.

b. Conducted by: Grounds maintenance personnel, natural resource managers, building occupants, or contractors.

B. Chemical.

1. Basis for Treatment: **Preventive Threshold:** sites having documented problems with grassy weeds during the prior growing season initiates control efforts with pre-emergent herbicide. **Corrective Threshold:** actual presence of grassy weeds treated using post-emergent herbicide.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 3; SC Category 3

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: Targeted grasses fail to germinate for 5 weeks following pre-emergent treatment. Targeted grasses are dead within 14 days following post-emergent treatments.

IV. Precautions for Sensitive Areas: See the pesticide label for precautions. Do not allow personnel on treated turf until after sprays have dried.

V. Prohibited Practices: Do not apply pre-emergent herbicides if targeted grasses have already germinated. MSMA will not be applied to St. Augustine grasses.

VI. Environmental Concerns: Do not apply herbicides when winds may create undesirable drift. See the pesticide label for additional concerns.

VII. Remarks:

A. Insect control is another element in controlling grasses in turf. When insect control is needed:

1. Identify the pest problem.

2. Select the chemical recommended for control.

3. Be sure the turf will tolerate the chemical used.

4. Apply the chemical according to label recommendations. The Extension agents should be contacted to determine the optimum dates for applying pre-emergent herbicides.

B. When selecting/using other herbicides than those identified above, equivalent herbicides must contain the same active ingredients, be within 5% concentration of the active ingredients, have the same application sites, and the target pest(s) must be on the herbicide label.

C. Herbicides should only be used in areas of high aesthetic value, preferably as a "spot" treatment rather than broadcast treatment

D. The Office of the Under Secretary of Defense issued a memorandum requiring the implementation of Ecosystem management in the Department of Defense Memorandum, DUSD, (ES/EQ-C), 8 August 1994, subject: Implementation of Ecosystem Management in the DOD. Ecosystem management is elaborated in DOD Instruction 4715.3, and the DOD Commander's Guide to Biodiversity and Handbook for Natural Resources Managers. Special attention should be paid to prescribed burns to mimic natural burn patterns that restore the indigenous ecosystem and control noxious weeds.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 20

PEST: Weeds in Ornamental Plant Beds.

SITE: Ornamental Plant Beds.

I. Purpose: to selectively control grassy and broadleaf weeds in ornamental plant beds.

II. Surveillance.

A. Conducted by: Facility/building occupants, pest management personnel and PMQAE staff.

B. Methods: visual inspection.

C. Frequency: monthly, April through October.

III. Pest Management Techniques.

A. Non-chemical. The most effective means of controlling unwanted vegetation is to manually remove the vegetation in and around ornamental plants.

1. Type: Biological.

   a. Method and Location: None

   b. Conducted by:

   c. Control Standard:

2. Type: Mechanical and Physical.

   a. Method and Location: manually removing unwanted plants.

   b. Conducted by: grounds maintenance personnel.

3. Type: Cultural.

   a. Method and Location: .

   b. Conducted by.

B. Chemical.

1. Basis for Treatment: **Preventive Threshold:** in sites where pre-emergent herbicides will be applied and historically had weed problems. **Corrective Threshold:** sites having visible vegetative growth.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pest Management Technicians. SC Category 3

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standards: Treated vegetation will be dead within 30 days following herbicide application.

IV. Precautions for Sensitive Areas: Ensure pesticide used is compatible with the ornamental plants.

V. Prohibited Practices: IAW pesticide label requirements.

VI. Environmental Concerns: Avoid movement of pesticides from off target.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 21

PEST: Hardwood Trees and Brush including stumps.

SITE: Forested areas on the installation.

I. Purpose: To improve habitat for the red-cockaded woodpecker, an endangered species, and other wildlife. To reduce fuel for uncontrolled fires and prevent re-growth of stumps.

II. Surveillance.

A. Conducted by: Forestry or other natural resource personnel conduct surveys during planned work. QAEs may inspect to assure quality of contracted pest management services.

B. Methods: Inspections.

C. Frequency: Inspections are conducted by forestry or other natural resource personnel as needed. Surveys may be conducted during the previous or current growing season to determine the need for control measures by forestry or other natural resource personnel. QAEs inspect during or after contract performance.

III. Pest Management Techniques.

A. Non-chemical. NOTE: Non-chemical control methods are primarily used. Chemical control is used to treat individual stumps from cut broadleaf trees or brush.

1. Type: Mechanical and Physical.

a. Method and Location: Remove cull hardwoods in timber stands by using chain saws or other mechanical devices.

b. Conducted by: Forestry or Natural Resource personnel or contractors.

2. Type: Cultural.

a. Method and Location: Prescribed burning in forested areas is the primary control method. Burns are performed at 1 to 5-year intervals to kill hardwoods and to remove fuel for wildfire.

b. Conducted by: Forestry / Natural Resource personnel or contractors.

B. Chemical.

1. Basis for Treatment: **Corrective Threshold:** broadleaf trees or brush are cut and stumps are treated to prevent re-sprouting.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 2; SC Category 2

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: Treated vegetation is dead within 30 days following herbicide application. No re-sprouting to chemically treated stumps.

IV. Precautions for Sensitive Areas: Read labels for further precautions. Use extreme caution when applying to minimize damage to desirable vegetation.

V. Prohibited Practices: Do not get herbicides in water sources.

VI. Environmental Concerns: Read label.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 22

PEST: Kudzu (*Pueraria lobata*)

SITE: Rights-of-way, old fields, vacant lots, or the yards of abandoned or little-used buildings.

I. Purpose: To eradicate every kudzu plant in order to prevent the destruction of more favorable plants.

II. Surveillance.

A. Conducted by: Building occupants or facility managers may conduct initial observations and submit service orders. Most surveys are performed by ground maintenance personnel. Ground maintenance personnel may conduct surveys in response to service requests. Pest management or ground maintenance QAEs may perform surveys for quality assurance of contractual pest management services.

B. Methods: Visual observations for the presence of the vine.

C. Frequency: Building occupants or facility managers conduct surveillance during the performance of their assigned tasks.

III. Pest Management Techniques.

A. Nonchemical. NOTE: Nonchemical controls are the primary methods used and pesticides are used only to supplement control efforts when necessary.

1. Type: Mechanical and Physical.

a. Method and Location: Mowing, tillage, or prescribed burning can prepare areas for more efficient herbicide applications. However, tillage and prescribed burning should not be used on steeply sloping lands where erosion is a risk. Prior to conducting prescribed burning on Fort Jackson, coordinate with the Forestry, Fish and Wildlife and Natural Resources Personnel since endangered plants and animals are found on Fort Jackson.

b. Conducted by: Contractors, pest management personnel, or grounds maintenance personnel.

2. Type: Biological.

a. Method and Location: None applied.

b. Conducted by:

3. Type: Cultural.

a. Method and Location: If goats or sheep can be used, they will clear open and forested areas of kudzu.

b. Conducted by: Land Management and Facility Management personnel.

B. Chemical.

1. Basis for Treatment: **Corrective Threshold:** the presence of kudzu initiates control operations.

2. Method and Location: As per label directions.

3. Conducted by: Certified Pesticide Applicator: DOD Category 6 (along right-of-ways) & 2 (in forest sites); SC Category 6 (along right-of-ways) or 2 (in forest sites)

4. Pesticide. See Appendix D (Pesticide Use Proposal)

5. Control Standard: Majority (75 to 90%) of the kudzu plants have died within 2 weeks after application.

IV. Precautions for Sensitive Areas: Avoid destruction of non-target foliage and avoid drift. Do not apply in areas in which endangered or threatened animal and plant species are found.

V. Environmental Concerns: The previously mentioned pesticides are toxic to fish. Do not apply directly to water and to areas where surface water is present.

VII. Remarks: Consult the Fort Jackson forester and Natural Resources personnel prior to application of these pesticides. All applicators must follow the label and abide by all local and national laws.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 23

PEST: Vegetation competing with Pine stands. (Pine release).

SITE: Forested areas at Fort Jackson where pines have been planted or seeded (Loblolly, Longleaf, Short leaf and Slash Pine).

I. Purpose: To reduce vegetative competition to pines that reduces growth and vigor, and to reduce hardwood tree species to improve habitat for the endangered Red-cockaded Woodpecker.

II. Surveillance.

A. Conducted by: Forestry or other natural resource personnel conduct surveys by visual observation during planned work. Forestry or pest management QAEs may perform surveys for quality assurance of contractual pest management services.

B. Methods: Visual observations.

C. Frequency: Visual observations are conducted by forestry or other natural resource personnel during work operations. Surveys are scheduled after planting or seeding operations. Surveys may include observations conducted during the previous or current growing season to determine the need for control measures. Forestry or pest management QAEs perform surveys during or as follow up after contract performance.

III. Pest Management Techniques.

A. Nonchemical. NOTE: Nonchemical controls are the primary methods used and pesticides are used only to supplement control efforts when necessary.

1. Type: Mechanical and Physical.

a. Method and Location: Mechanical removal may be selected to thin out existing pines (5-10 year cycle management cycle) or cull hardwoods in timber stands by using chain saws or other mechanical devices.

b. Conducted by: Forestry or contract personnel.

2. Type: Biological.

a. Method and Location: None.

b. Conducted by:

3. Type: Cultural.

a. Method and Location: Prescribed burning in pine stands may be performed on 1 to 5 year intervals to kill hardwoods and to remove fuel for wildfire. Often burning must be performed during the growing season to effectively control hardwood species. Typically, larger diameter hardwoods cannot be effectively controlled with prescribed fire in a pine or pine/hardwood stand without potentially causing damage to the pines.

b. Conducted by: Forestry personnel, or contractors.

B. Chemical.

1. Basis for Treatment: **Corrective Threshold:** present vegetation competes with existing seedlings or saplings or a thinning operation is needed, or when it is determined that the vegetation is impacting the quality of habitat for the Red-cockaded Woodpecker.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 2; SC Category 2

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: Vegetation color change (chlorosis or browning) is noted within 8 weeks and vegetation is killed within 4 months following treatment.

IV. Precautions for Sensitive Areas: Avoid contact with foliage of desirable vegetation. Avoid direct application to any body of water. Avoid drift that could damage desirable plants. Aerial applications of pesticides will be monitored such that applications do not occur over wetlands or environmentally sensitive areas such as unique habitat of threatened or endangered species.

V. Prohibited Practices: Do not mix, store or apply Arsenal in galvanized steel or unlined steel containers (except stainless steel). This product reacts with such containers to produce hydrogen gas. This gas mixture could flash or explode. To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours. Use of drift control additives is not recommended when applying Accord by aerial equipment. Do not perform aerial spray operations when weather conditions create an air inversion or when wind speed exceeds 5 mph.

VI. Environmental Concerns: Prior to initiating prescribed burning, notify the S.C. Forestry Commission, have a written burn plan, and a designated fire boss. Do not apply herbicides directly to water or wetlands. Do not contaminate water when disposing of equipment rinse water. Velpar will leach through soil and contaminate groundwater. In areas of permeable soil where the water table is shallow Velpar should not be used.

VII. Remarks:

A. All aerial spray projects will receive major command pest management consultant or higher review and approval prior to conducting any aerial spray operation and follow the guidance of DOD Directive 4150.7. Approval must be from a pest management consultant who is certified in aerial pest control. The picloram herbicides (Tordon), are listed in this outline. They are restricted-use and their use will require notification and authorization from the AEC command entomologist.

B. The Office of the Under Secretary of Defense issued a memorandum requiring the implementation of Ecosystem management in the Department of Defense (Memorandum, DUSD, (ES/EQ-C), 8 August 1994, subject: Implementation of Ecosystem Management in the DOD. Ecosystem management is elaborated in DOD Instruction 4715.3, and the DOD Commander's Guide to Biodiversity and Handbook for Natural Resources Managers. ‘;’

INTEGRATED PEST MANAGEMENT OUTLINE NO. 24

PEST: Pine plantation site preparation.

SITE: Forested areas on Fort Jackson where pines will be planted or seeded.

I. Purpose: To prepare forested areas for planting pines and reduce vegetative competition that inhibits germination, growth, or vigor of the newly planted pine.

II. Surveillance.

A. Conducted by: Forestry or other natural resource personnel conduct surveys by visual observation during planned work. Natural resource personnel or pest management QAEs may perform surveys for quality assurance of contractual pest management services.

B. Methods: Visual observations.

C. Frequency: Visual observations are conducted by forestry or other natural resource personnel during work operations. Forestry or pest management QAEs perform surveys during or as follow-up after contract performance.

III. Pest Management Techniques.

A. Nonchemical. NOTE: Nonchemical controls are the primary methods used and pesticides are used only to supplement control efforts when necessary.

1. Type: Mechanical and Physical.

a. Method and Location: A drum and chop method may be used. This method employs a large, cylindrical drum with water, which is hitched to a tractor and pulled over fairly scarce debris such as herbaceous weeds and small tree limbs. The drum crushes the debris into small pieces. The shear and pile method may also be used. This method is used in areas with thick debris, such as large stumps and tree limbs. Mechanical tools gather thick debris into piles and the piles are then burned. Mechanical removal may be selected to thin out existing trees in timber stands by using chain saws or other mechanical devices.

b. Conducted by: Natural resource personnel, grounds maintenance personnel, or contractors.

2. Type: Biological.

a. Method and Location: None.

b. Conducted by:

3. Type: Cultural.

a. Method and Location: Prescribed burning in pine stands will be performed on 1 to 5 year intervals to kill hardwoods and to remove fuel for wildfire. Controlled burns may also follow mechanical site-preparation operations or herbicide operations.

b. Conducted by: Forestry personnel or contractors.

B. Chemical.

1. Basis for Treatment: **Preventive Threshold:** site preparation for planting or seeding is required and present vegetation will likely reduce the success of reforestation or wildlife habitat improvement projects.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 2; SC Category 2

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: Vegetation color change (chlorosis or browning) is noted within 8 weeks and vegetation is killed within 4 months following treatment. A general control standard will be 90% free to grow for 2 years after treatment. A "free to grow" pine is defined as any living pine tree that has no overtopping hardwood shade and where side-shading of hardwoods does not exceed 75% of the height of the pine.

IV. Precautions for Sensitive Areas: Avoid contact with foliage of desirable vegetation. Avoid direct application to any body of water. Avoid drift, which could damage desirable plants. Aerial applications of pesticides will not occur over wetlands or environmentally sensitive areas such as unique habitat of threatened or endangered species.

V. Prohibited Practices: Do not mix, store or apply Arsenal in galvanized steel or unlined steel containers (except stainless steel). This product reacts with such containers to produce hydrogen gas. This gas mixture could flash or explode. To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours (except Velpar). Use of drift control additives is not recommended when applying Accord by aerial equipment. Do not perform aerial spray operations when weather conditions create an air inversion or when wind speed exceeds 5 mph.

VI. Environmental Concerns: Prior to initiating prescribed burning, obtain a burning permit, prepare a written burn plan, and designate a fire boss. Do not apply herbicides directly to water or wetlands. Do not contaminate water when disposing of equipment rinse water. Velpar will leach through soil and contaminate groundwater. In areas of permeable soil where the water table is shallow Velpar should not be used.

VII. Remarks: All aerial spray projects will receive major command pest management consultant or higher review and approval prior to conducting any aerial spray operation and follow the guidance of DOD Instruction 4150.7. Approval must be from a pest management consultant who is certified in aerial pest control. Glyphosate causes eye irritation and is harmful if swallowed. It may also cause skin irritation. Wear chemical-resistant gloves and goggles.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 25

PEST: Aquatic Vegetation.

SITE: Lakes and ponds.

I. Purpose: To control aquatic vegetation.

II. Surveillance.

A. Conducted by: Fish and Wildlife personnel.

B. Methods: Inspections for aquatic weeds.

C. Frequency: During fishery duties or in response to complaints by anglers.

III. Pest Management Techniques.

A. Non-chemical. The most effective means of controlling aquatic vegetation is to control nutrient levels in bodies of water on Fort Jackson. Too much fertilizer in surrounding areas leaching into water promoting aquatic vegetation growth.

1. Type: Biological.

a. Method and Location: Aquatic weed control can be handled biologically with insects or plant-eating fish. Sterile grass carp may be introduced to reduce excessive aquatic vegetation. Some introduced weeds have had insects introduced to help control them.

b. Conducted by: Natural resources personnel.

c. Control Standard: Maintain aquatic vegetation so that it does not negatively impact harvestable fish and angling.

2. Type: Mechanical and Physical.

a. Method and Location: Draglines or backhoes are frequently used for mechanical control of aquatic weeds in ditches, canals, boat landings or shorelines. A variety of floating, cutter and harvester machines are manufactured which can be used in many aquatic sites.

b. Conducted by: Natural resource personnel or by contract.

3. Type: Cultural.

a. Method and Location: Control and clean off weeds on personal watercraft when moving the boat by trailer from one water system to another. Also do not introduce exotics for decorative purposes.

b. Conducted by. Individuals and natural resources personnel.

B. Chemical.

1. Basis for Treatment: **Corrective Threshold:** aquatic vegetation is too thick to navigate watercraft, impacting native aquatic vegetation, impeding water circulation or inhibiting fish population growth.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 5; SC Category 5

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standards: Treated vegetation will be dead within 30 days following herbicide application.

IV. Precautions for Sensitive Areas: Contact the South Carolina Department of Natural Resources (SCDNR) and water authorities in areas where control activities can affect public waters.

V. Prohibited Practices: Contact Natural Resource personnel.

VI. Environmental Concerns: Grass carp for restocking must be sterile (triploid) and obtained from sources approved by the SCDNR. Restocking rates and frequency are determined by Natural Resources personnel.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 26

PEST: Beaver

SITE: Beaver problems may include along waterways in training, recreational, and cantonment areas.

I. Purpose: To remove nuisance animals that have damaged valuable landscape trees, burrow in water impoundment structures, or created flooding which threatens manmade structures, military training or wildlife habitats.

II. Surveillance.

A. Conducted by: Initial surveys by observation are typically area users who report suspected damage. Natural Resources personnel or Natural Resources Law Enforcement officers conduct surveys in response to service requests or during other work duties.

B. Methods: Visual observation for live animals, plant damage, tracks, and flooding. Nocturnal activity may be observed using a spot-light with a red filter lens or other night-vision devices.

C. Frequency: Natural Resources personnel and Natural Resources Law Enforcement officers perform surveys when services are requested by reporting problem beaver or during their performance of other job duties.

III. Pest Management Techniques.

A. Non-chemical. NOTE: Non-chemical controls are the only methods used and pesticides are not used to supplement control efforts.

1. Type: Mechanical and Physical.

a. Method and Location:

(1) Exclusion may be practiced by using barriers of sheet metal or hardware cloth around ornamental plants. These barriers extend from the ground to about 4 feet. Barrier construction is performed as soon as evidence of damage begins.

(2) Population reduction my include shooting by officials who are authorized to control beaver. A potential method is to break dams in the morning and to shoot the beavers that night when they come to repair it. Shooters must be at the site about an hour before dark, be located in a good location for shooting and be quiet and still as possible. Extreme care will be practiced to avoid ricochets off water from shooting. Shooters should use elevated sites to lessen the possibility of ricocheting and night-vision scopes to enhance visibility.

(3) Trapping is an effective method used for controlling beaver. Live traps, lethal traps (conibears) and snares can be used.

b. Conducted by: Exclusion work may be performed by facility maintenance, Natural Resources or contracted personnel. Shooting and trapping is performed by Natural Resources or Game Enforcement personnel. Experienced and licensed local trappers who have permits to trap on installation property may perform trapping. Personnel involved in Nuisance Animal Damage Control operations shall be permitted by the SCDNR with the necessary depredation permits when required.

c. Control Standard:

(1) Exclusion successfully prevents or terminates vegetation damage for 1 year.

(2) Shooting or trapping removes the target animal(s) which are causing damage within 1 week and damage does not reoccur for three months.

2. Type: Biological: None applied.

3. Type: Cultural.

a. Method and Location: Habitat alteration may be practiced near ponds or other reservoirs to prevent beaver from moving in or to encourage them to move out. Eliminating food supplies and aquatic habitat are probably the only cultural methods that have significant effects on beaver.

b. Conducted by: Natural Resources personnel.

B. Chemical. **NONE.** <u>There are no toxicants, repellents or fumigants registered by the EPA for beaver control.</u>

IV. Precautions for Sensitive Areas: Shooting is only conducted in areas approved by local law enforcement officials. Areas being trapped will marked with signs “Danger Beaver Trap”. Traps will be checked daily.

V. Prohibited Practices: Traps will not be set on or during weekends and holidays unless approved by the DLE-Wildlife Office.

VI. Environmental Concerns: None.

VII. Remarks:

INTEGRATED PEST MANAGEMENT OUTLINE NO. 27

PEST: Undesired Fish (e.g. sunfish, perch, shad, carp, etc.)

SITE: Ponds and other fish habitats.

I. Purpose: To remove all fish prior to restocking ponds with improved desirable fish ratios or to remove non-desirable fish species (selective control)

II. Surveillance.

A. Conducted by: DLE, Natural Resources, Fish and Wildlife personnel.

B. Methods: Use of fishnets or traps and electric shocking.

C. Frequency: As needed and prior to re-stocking.

III. Pest Management Techniques.

A. Non-chemical. NOTE: Non-chemical controls are the primary methods used and pesticides are used only to supplement control efforts when necessary.

1. Type: Mechanical and Physical.

a. Method and Location: Draining ponds is one measure for removing the fish population.

b. Conducted by: DLE personnel.

2. Type: Cultural. None applicable.

3. Type: Biological. None applicable.

B. Chemical.

1. Basis for Treatment: **Corrective Threshold:** control is based on surveillance results and when mechanical control is not effective.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 5; SC Category 5

4. Pesticides: See Appendix D (Pesticide Use Proposal)

IV. Precautions for Sensitive Areas: Do not use or store rotenone near heat or open flame.

V. Prohibited Practices: Keep pesticide out of fish-breeding habitats except under use conditions.

VI. Environmental Concerns: Need AEC PMC approval to use pesticide in aquatic sites.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 28

PEST: Ants (house ants, pharaoh ants, and pavement ants).

SITE: Buildings in cantonment area.

I. Purpose: To eliminate ants from housing units, barracks, administrative and messing facilities.

II. Surveillance.

A. Conducted by: Building occupants or pest management technicians in situations where professional assistance is needed (typically heavy infestations). Pest management QAEs may perform surveys for quality assurance of contractual pest management services.

B. Methods: Visual observation.

C. Frequency: Unplanned visual observations by building occupants. Pest management technicians perform surveys when services are requested. Pest management QAEs performs surveys as follow up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

III. Pest Management Techniques.

A. Non-chemical

1. Mechanical and Physical.

a. Method and Location: Ant harborage is eliminated by caulking minor cracks, crevices, and holes in walls, especially in food storage, consumption, and preparation areas.

b. Conducted by: Building occupants apply caulking materials. Assistance to caulk is occasionally performed by maintenance personnel or management technicians.

2. Cultural.

a. Method and Location: Proper sanitation to eliminate food and water sources in areas where food is stored prepared and consumed. Stored food products are kept in containers with tight fitting lids. Empty food container waste is removed from buildings daily were ants have been observed.

b. Conducted by: Building occupants and janitorial services

B. Chemical. NOTE:

1. Basis for Treatment: **Corrective Threshold:** any level of ant infestation can be treated using baits. Only moderate to high levels of ant infestations can be treated using other types of pesticides.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 7; SC Category 7A

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: No visible live ants for 30 days after treatment.

IV. Precautions for Sensitive Areas: IAW labeled instructions.

V. Prohibited Practices: Do not apply aerosol spray to food, utensils, and food preparation surfaces. Keep residual insecticides off of ant bait stations so ants are not repelled from the bait.

VI. Environmental Concerns: IAW labeled instructions.

VII. Remarks: Ants are normally a minor problem. Baits, which provide thorough colony control, are the primary method of chemical control. Effective ant control is based upon correct identification of ant species and implementing control procedures that targets that specific species.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 29

PEST: American, German, Brown Banded, Oriental and Smoky Brown Cockroaches.

SITE: Sewers, crawl spaces and other below ground and above ground areas.

I. Purpose: To control cockroach infestations in basements, crawl spaces, and other below ground or on-ground areas in buildings.

II. Surveillance.

A. Conducted by: Building occupants and maintenance personnel. Pest Management Technicians conduct surveys when services are requested following self-help failure where professional assistance is needed (typically heavy infestations). Pest management QAEs performs surveys as follow up after contract performance.

B. Methods: Sticky traps or visual observation. Sticky traps and visual observations in food preparation/consumption areas, sewer manholes, and crawl spaces.

C. Frequency: Unplanned visual observations by building occupants. Sticky traps are used at least semiannually and 1 to 2 weeks after chemical controls are applied to determine control effectiveness.

III. Pest Management Techniques.

A. Non-chemical.

1. Type: Mechanical and Physical.

a. Method and Location: Eliminate moisture in basements and other belowground areas in buildings that could support cockroaches. Ventilate wet or damp areas under buildings. In buildings, which experience frequent invasion of American cockroaches, drains, particularly those in the basements or on ground level, should have grates or screens over the openings with a mesh size less than 1/8-inch. Utility doors should fit tightly, and pipe chases and other entry points should be sealed. Shrubs adjacent to building exteriors will be trimmed to maintain air circulation next to buildings. Outbuildings should be kept neat and woodpiles will be located at least 75 feet away from structures. Vacuums may also be used to remove cockroaches indoors.

b. Conducted by: Building occupants and maintenance personnel.

2. Type: Cultural.

a. Method and Location: Proper sanitation to eliminate food and water sources.

b. Conducted by: Building occupants and maintenance personnel.

B. Chemical.

1. Basis for Treatment: **Corrective Threshold:** any level of roach infestation can be treated using baits. Only moderate to high levels of infestations can be treated using other types of pesticides.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 7; SC Category 7A

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: No presence of live cockroaches for 30 days after treatment.

IV. Precautions for Sensitive Areas: Do not treat sewers if precipitation is anticipated within 12 hours.

V. Prohibited Practices: Do not apply pesticides on food, utensils, or food preparation surfaces. Do not let unauthorized personnel in treatment areas until applied materials have dried and vapor odors have subsided.

VI. Environmental Concerns: IAW labeled instructions.

VII. Remarks: American cockroaches in sewers (i.e. at manhole sites) can become a problem if the manholes are located near buildings and the cockroaches can migrate into work areas. Insecticide rotation for these larger cockroaches is not normally necessary.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 30

PEST: Silverfish.

SITE: Buildings post wide.

I. Purpose: To reduce/eliminate damage caused by silverfish to paper products.

II. Surveillance.

A. Conducted by: Building occupants and pest controllers.

B. Methods: Visual observation.

C. Frequency: Unplanned visual observations by building occupants.

III. Pest Management Techniques.

A. Non-chemical.

1. Type: Mechanical and Physical.

a. Method and Location: Exclusion and insect sticky traps.

b. Conducted by: Building occupants and maintenance personnel.

2. Type: Cultural.

a. Method and Location: Remove unnecessary boxes and paper products from buildings. Take measures to reduce moisture by utilizing dehumidifiers/dehydrating agents, and increasing airflow in damp areas.

b. Conducted by: Building occupants and maintenance personnel.

B. Chemical.

1. Basis for Treatment: **Corrective Threshold:** observation of silverfish initiates control efforts.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 7; SC Category 7A

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: No visible live insects for 30 days after treatment.

IV. Precautions for Sensitive Areas: IAW labeled instructions.

V. Prohibited Practices: IAW labeled instructions.

VI. Environmental Concerns: IAW labeled instructions.

VII. Remarks: None.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 31

PEST: Crickets, Earwigs, and other crawling insects.

SITE: Facilities post wide.

I. Purpose: To control miscellaneous crawling insects in housing, barracks, administrative buildings and other structures.

II. Surveillance.

A. Conducted by: Building occupants by visual observation and pest management technicians in rare situations where professional assistance is needed (typically heavy infestations). Pest management QAEs may perform surveys for quality assurance of contractual pest management services.

B. Methods: Visual observation. Sticky traps may be used when performing quality assurance of control operations.

C. Frequency: Pest management technicians perform surveys when services are requested following self-help failure. Pest management QAEs performs surveys as follow up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

III. Pest Management Techniques.

A. Non-chemical.

1. Type: Mechanical and Physical.

a. Method and Location: Sticky traps are placed along baseboards in areas where crawling arthropods are seen or heard. This method is used to help control minor infestations. To prevent infestations indoors, arthropods are excluded from buildings with tight-fitting doors and window screens. Yellow light bulbs are used for night-lights at building entrances to reduce the effect of lights attracting these insects. Installation of high-pressure sodium streetlights, which attract insects much less than the typical mercury vapor lights, is encouraged. Unnecessary plant debris, mulches, and rocks are removed away from building perimeters. Excess moisture sources around building exteriors (i.e. leaking faucets or improperly installed downspouts or splashguards) are eliminated.

b. Conducted by: Building occupants use sticky traps and may perform minor window screen and weather-stripping maintenance. Maintenance personnel perform structural repairs including screening, weather-stripping, and street light installation.

2. Type: Cultural.

a. Method and Location: Sanitation is practiced to reduce harborage. Arthropods often hide in areas, which are cluttered with trash, old boxes, and other debris; cleanup of these types of items may help to reduce cricket infestations. Weeds and grasses are cut or removed around building perimeters. Reduce harborage and excessive moisture by pruning branches of deciduous and broad-leafed evergreen shrubs to create a minimum 6-inch space above the ground.

b. Conducted by: Conducted by: Building occupants conduct indoor sanitation practices and grounds maintenance personnel perform vegetation control.

B. Chemical.

1. Basis for Treatment: **Corrective Threshold:** any level of infestation can be treated using baits. Only moderate to high levels of infestations can be treated using other types of pesticides.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 7; SC Category 7A

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: No presence of live insects for 30 days after treatment.

IV. Precautions for Sensitive Areas: Do not contaminate food, utensils, food preparation surfaces, or food containers. Do not use, pour, or store chlorpyrifos near open flame.

V. Prohibited Practices: Do not permit unauthorized personnel in treatment areas until applied materials have dried and vapor odors have subsided.

VI. Environmental Concerns: IAW labeled instructions.

VII. Remarks: Exclusion, harborage reduction, moisture and light control are the primary methods to control crawling arthropods indoors.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 32

PEST: Southern Pine Beetle.

SITE: Pine trees post wide.

I. Purpose: Prevent loss of commercial and ornamental pine stands and endangered species habitat.

II. Surveillance.

A. Conducted by: Forestry personnel.

B. Methods: Visual observation of infested areas. Ground observation (with binoculars) is made for dead or dying trees and the presence of pitch tubes, boring dust, and galleries. Aerial observation is made for dead trees and chlorotic or reddened tree crowns.

C. Frequency: Annually May through September.

III. Pest Management Techniques.

A. Non-chemical Techniques.

1. Type: Mechanical and Physical.

a. Method and Location:

(1) Preventive techniques include: Vigorous tree growth is encouraged. Pine rotations are shortened in areas where beetles have historically caused considerable loses. Where beetles are active, harvest and thinning operations or severe pruning is delayed until winter when beetle activity has declined. Storm or lighting damaged trees are removed as quickly as possible. Mechanical tree damage such as skinning of trunks, partial pushovers, etc. is minimized. Skinned trees next to skid trails, logging roads and loading decks are removed and salvaged. Barricades are built around trees to prevent mechanical damage by equipment in yard and landscape environments. Root damage by keeping trenching and digging is kept to a minimum. Final soil grade around tree trunks and roots is maintained at the same height as it was before construction during landscaping operations. Recommended stocking rates in timber stands is maintained in commercial forest sites.

(2) Corrective techniques include: The control method of choice in commercial timber stands is salvage operations to remove dead and infested trees creating a 1 chain buffer strip in the direction the infestation is migrating. In landscaped trees where infestations are present, all trees still infested or showing signs of attack, as well as dead trees are removed immediately. In commercial stands, all trees that have developing brood are cut and removed from the site when possible. Where verified that the bark beetles have already left the tree and the tree is not a hazard, it may be left standing to allow beneficial insects to emerge to help control the future bark beetle populations.

IV. Precautions for Sensitive Areas: Do not allow unauthorized personnel in treatment areas until spray has dried. Control methods prescribed for areas containing or used by endangered species must be coordinated with the U.S. Fish and Wildlife Service.

V. Prohibited Practices: Do not allow drift onto vehicles.

VI. Environmental Concerns: Do not apply insecticides with a powered sprayer when wind speed is greater than 8 mph, during precipitation, or if rainfall is expected within 8 hours.

VII. Remarks: Nonchemical controls are the primary methods practiced for controlling Southern pine beetles.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 33

PEST: Japanese Beetle.

SITE: Cantonment area.

I. Purpose: To control Japanese beetle infestations in the cantonment area to reduce damage to ornamental plants.

II. Surveillance.

A. Conducted by: All personnel may report adult Japanese beetle activity. Grounds maintenance personnel perform white grub surveys.

B. Methods: Visual observation on ornamental plantings. The presence of birds feeding on turf areas often indicates the presence of beetle grubs in the soil. Grubs can be seen in the turf by lifting suspect sections of turf with a spade and examining the root area. Historical problem areas should be kept under surveillance. The threshold for control is 10 grubs per square foot for moisture stressed turf and 15 grubs per square foot for irrigated turf not under stress.

C. Frequency: Unplanned visual observations by building occupants, golf course, and athletic field managers. White grub surveys should begin in June and may continue until early fall. Surveys will be conducted as early as possible necessary so follow-up treatment can take place when the larvae are small and near the soil surface.

III. Pest Management Techniques.

A. Non-chemical.

1. Type: Mechanical and Physical.

a. Method and Location: Hand collecting adult beetles can be accomplished when beetles are not numerous. The use of beetle traps is not recommended, and can do more harm than good. Many beetles attracted to the trap do not make it into the trap. Also traps tend to draw beetles from adjacent areas, which compounds the problem for the individual using the trap.

b. Conducted by: Building occupants.

2. Type: Biological.

a. Method and Location: Apply milky spore disease to the infested lawn/turf areas. Milky spore is a bacterial disease that attacks the beetle grub during the in-ground period of the life cycle. This method is not recommended, since its efficacy has come into recent question.

b. Conducted by: Building occupants and pest controllers.

3. Type: Cultural.

a. Method and Location: Utilize plants in landscaping that are not susceptible or are less susceptible to Japanese beetle damage. Healthy, well-maintained turf grass can tolerate insect and disease attacks. Utilizing good turf management practices will reduce the need for control.

b. Conducted by: Building occupants and maintenance personnel.

B. Chemical.

1. Basis for Treatment: **Corrective Threshold:** observation of moderate to heavy infestations of Japanese beetles feeding on ornamental plants or grubs in turf initiates control efforts.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 3; SC Category 3

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: No live beetles in 7 to 10 days after treatment. Grub populations reduced from a moderate/heavy infestation to a light infestation.

IV. Precautions for Sensitive Areas: IAW labeled instructions.

V. Prohibited Practices: IAW labeled instructions.

VI. Environmental Concerns: IAW labeled instructions.

VII. Remarks: Japanese beetles are extremely difficult to control. Utilizing ornamental plantings that are less susceptible to beetle damage is the most effective method of controlling populations. The highest Japanese beetle grub populations occur in turf areas around preferred ornamentals of the adults.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 34

PEST: Defoliators (Caterpillars).

SITE: Ornamental trees and shrubs in the cantonment area.

I. Purpose: Prevent/reduce killing, costly damage and/or visual degradation of ornamental plants.

II. Surveillance.

A. Conducted by: Building occupants and Roads and Grounds personnel. Pest management technicians in response to service requests. Pest management QAEs may perform surveys for quality assurance of contractual pest management services.

B. Methods: Visual observation for damage or insects.

C. Frequency: Visual observations are conducted by building area occupants and maintenance personnel during work operations. Pest management technicians perform surveys when services are requested. Pest management QAEs performs surveys as follow up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

III. Pest Management Techniques.

A. Non-chemical

1. Type: Mechanical and Physical.

a. Method and Location: Remove (hand pick) insects from plants

b. Conducted by: Building occupants and pest controllers.

2. Type: Biological.

a. Method and Location: Apply *Bacillus thuringiensis* (Bt) in accordance with label directions. Bt should be applied to all leaf surfaces of the trees. Heavy rains following treatment may necessitate retreatment.

b. Conducted by: Pest management technicians.

3. Type: Cultural.

a. Method and Location: Select plant species that are resistant to infestation.

b. Conducted by: Roads and grounds personnel, Corps of Engineers on new construction, and the pest management coordinator.

B. Chemical.

1. Basis for Treatment: **Corrective Threshold:** when moderate to heavy infestation(s) detract from plant's aesthetic value or can possibly cause permanent injury to the plant.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 3 (general sites) & 2 (forest areas); SC Category 3 (general sites) or 2 (forest areas)

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: No live insects within 5 days after treatment.

IV. Precautions for Sensitive Areas: Apply insecticides carefully to avoid killing foraging honeybees. Notify building occupants prior to conducting spray operations if they are near the treatment area.

V. Prohibited Practices: Do not allow drift onto vehicles.

VI. Environmental Concerns: Do not apply insecticides with a powered sprayer when wind speed is greater than 8 mph, during precipitation, or if rainfall is expected within 8 hours.

VII. Remarks: Chemicals are used only as a last resort when plants have high insect populations.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 35

PEST: Sap-Feeders (aphids, scales, lacebugs, leafhoppers, whiteflies, etc.)

SITE: Ornamental trees and shrubs in the cantonment area.

I. Purpose: Prevent/reduce killing, costly damage and/or visual degradation of ornamental plants.

II. Surveillance.

A. Conducted by: Building occupants and Roads and Grounds personnel. Pest management technicians in response to service requests. Pest management QAEs may perform surveys for quality assurance of contractual pest management services.

B. Methods: Visual observation for damage or insects.

C. Frequency: Visual observations are conducted by building area occupants and maintenance personnel during work operations. Pest management technicians perform surveys when services are requested. Pest management QAEs performs surveys as follow up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

III. Pest Management Techniques.

A. Non-chemical.

1. Type: Mechanical and Physical.

a. Method and Location: Remove (hand pick) insects from plants

b. Conducted by: Building occupants and pest controllers.

2. Type: Biological.

a. Method and Location: Encourage breeding of beneficial predator and parasite insect species. Do not treat affected sites using pesticides unless heavy pest populations may cause death of plant.

b. Conducted by: All installation personnel.

3. Type: Cultural.

a. Method and Location: Select plant species that are resistant to infestation.

b. Conducted by: Roads and grounds personnel, Corps of Engineers on new construction, and the pest management coordinator.

B. Chemical.

1. Basis for Treatment: **Corrective Threshold:** observation of moderate to heavy infestations of actual pests initiates control efforts and detract from the plant's aesthetic value or can possibly cause permanent injury. Also, when deposits of honeydew (excretion from many types of sap-feeding insects) cause excessive soiling of vehicles or other equipment parked or stored under affected plants or trees.

2. Method and Location: As directed by the pesticide product label.

3. Conducted by: Certified Pesticide Applicator: DOD Category 3; SC Category 3

4. Pesticides: See Appendix D (Pesticide Use Proposal)

5. Control Standard: No live insects within 5 days after treatment.

IV. Precautions for Sensitive Areas: Apply insecticides carefully to avoid killing foraging honeybees. Notify building occupants prior to conducting spray operations if they are near the treatment area.

V. Prohibited Practices: Do not allow drift onto vehicles.

VI. Environmental Concerns: Do not apply insecticides with a powered sprayer when wind speed is greater than 8 mph, during precipitation, or if rainfall is expected within 8 hours.

VII. Remarks: Chemicals are used only as a last resort when plants have high insect populations.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 36

PEST: Golf Course Turf & Soil Insects

SITE: All turf grasses on the Golf Course: greens, tees and fairways

I. Purpose: To protect turf grasses from damage caused by turf and soil insects.

II. Surveillance:

A. Conducted By: Golf Course Superintendent and Greenskeeper staff.

B. Methods: Visual observation of feeding damage and of presence of actual pests. Monitoring soil samples for soil pests.

C. Frequency: Golf Course Superintendent and Greenskeeper staff conducts surveys during work operations, and record any turf & soil insect pest infestations.

III. Nonchemical Pest Management Techniques:

A. Maintain vigorously growing plants growth.

B. Tolerate minor infestations of turf and soil pest insects.

IV. Chemical Pest Management Techniques:

A. Basis of Treatment: **Corrective Threshold:** turf and soil pests controlled when reach moderate to heavy infestations.

B. Method and Location: Insecticides are applied using a power sprayer equipped with a boom or hand gun to affected turf areas on the golf course.

C. Conducted By: DoD Category 7 or SC Category 3

D. Pesticides : See Appendix D (Pesticide Use Proposal)

V. Precautions for Sensitive Areas: as per label directions.

VI. Prohibited Practices: as per label directions.

VII. Environmental Concerns: as per label directions.

VIII. Remarks:

INTEGRATED PEST MANAGEMENT OUTLINE NO. 37

PEST: Golf Course Turf Weeds

SITE: All Golf Course turf grass: greens, tees, fairways and roughs

I. Purpose: To control all weeds in managed turf areas of the Golf Course.

II. Surveillance:

A. Conducted By: Golf Course Superintendent and Greenskeeper staff.

B. Methods: Visual observation of any weed growth for post-emergent herbicide application and documenting weed problems for pre-emergent herbicide applications during subsequent growing seasons.

III. Nonchemical Pest Management Techniques:

A. Adjust mower-cutting height.

B. Maintain vigorously growing turf using proper fertilizer and irrigation.

C. Tolerate minor weed infestations.

IV. Chemical Pest Management Techniques:

A. Basis of Treatment: **Preventive Threshold:** pre-emergent herbicide treatments for sites with documented problems of weeds during previous growing seasons. **Corrective Threshold:** presence of actively growing moderate to heavy weed infestations for post-emergent herbicide treatment.

B. Method and Location: Herbicides are applied using a power or hand sprayer equipped with a boom or hand gun to infested turf areas on the golf course.

C. Conducted By: DoD Category 7 or SC Category 3

D. Pesticides. See Appendix D (Pesticide Use Proposal)

V. Precautions for Sensitive Areas: as per label directions.

VI. Prohibited Practices: as per label directions.

VII. Environmental Concerns: as per label direction.

VIII. Remarks: Follow directions for optimum timing of herbicide application.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 38

PEST: Golf Course Turf Diseases

SITE: All Golf Course turf grass: greens, tees, fairways and roughs

I. Purpose: To protect turf from plant diseases on turf grown under high management levels, with disease symptoms resulting in unsightly appearance of in-play areas, reduced playability, and thinning of turf which increases opportunities for invasion by annual grass and broadleaf weeds.

II. Surveillance:

A. Conducted By: Golf Course superintendent and greenskeeper staff.

B. Methods: Visual observation of plant damage, signs and symptoms and monitoring environmental conditions that are conducive for plant disease development.

C. Frequency: Golf Course superintendent or greenskeeper staff conduct surveys during work operations, and record potential for plant disease outbreaks.

III. Nonchemical Pest Management Techniques:

IV. Chemical Pest Management Techniques:

A. Basis of Treatment: **Preventive treatments** are provided when environmental conditions are conducive for plant disease development. **Corrective treatments** are applied as soon as plant disease signs and symptom occur.

B. Method and Location: Fungicides are applied using a power sprayer equipped with a boom or hand gun to affected turf areas on the golf course.

C. Conducted By: DoD Category 7 or SC Category 3

D. Pesticides. See Appendix D (Pesticide Use Proposal)

V. Precautions for Sensitive Areas: as per label directions.

VI. Prohibited Practices: as per label directions.

VII. Environmental Concerns: as per label directions.

VIII. Remarks: Follow label directions for time of treatment interval and severity of conditions.

INTEGRATED PEST MANAGEMENT OUTLINE NO. 39

PEST: Golf Course Nematodes

SITE: All Golf Course turf grass: greens, tees and fairways

I. Purpose: To protect turf from plant nematodes on turf grown under high management levels, with feeding symptoms resulting in unsightly appearance of in-play areas, reduced playability, and thinning of turf which increases opportunities for invasion by annual grass and broadleaf weeds.

II. Surveillance:

A. Conducted By: Golf Course superintendent and greenskeeper staff.

B. Methods: Visual observation of plant damage, signs and symptoms and monitoring environmental conditions that are conducive for plant disease development.

C. Frequency: Golf Course superintendent or greenskeeper staff conduct surveys during work operations, and record potential for plant disease outbreaks.

III. Nonchemical Pest Management Techniques:

IV. Chemical Pest Management Techniques:

A. Basis of Treatment: **Corrective treatments (only)** are applied when high nematode populations adversely affect the health and quality of turf.

B. Method and Location: Nematicides are applied using to affected turf areas on the golf course.

C. Conducted By: DoD Category 7 or SC Category 3

D. Pesticides. See Appendix D (Pesticide Use Proposal)

V. Precautions for Sensitive Areas: Golfers are not allowed on golf course for 24 hours following nematicide treatment.

VI. Prohibited Practices: as per label directions.

VII. Environmental Concerns: as per label directions.

VIII. Remarks: Follow label directions for time of treatment interval and severity of conditions.

APPENDIX B

PESTICIDE APPROVAL

REQUEST FORM

PESTICIDE APPROVAL REQUEST

Requester:_____**Phone**:_____**Date**:_____

1. Pesticide Trade Name__ _____ **Label & MSDS ATTACHED**

2. EPA Registration #_____

3. Common Name Active Ingredients _____Percent AI_____

   _____Percent AI_____

   _____Percent AI_____

4. Container Size_____

5. Purpose of Application:

   a. Pest_____

   b. Site(s) of Application_____

   c. Pesticide(s) Replacing_____

   Reason Needed_____

6. Formulation_____Diluent_____

7. Mixing Rates _____Percent AI (as applied)_____

8. Application Equipment_____ Rates of Application_____

9. Estimated quantity of pesticide needed (initial/annual)_____/_____

Does usage of this pesticide help the installation meet its 50% pesticide reduction goal? Y / N

10. Safety Precautions for applicator, installation personnel and environment._____

_____

11. Sensitive Areas_____

12. Source of Recommendation: county extension agent, pesticide vendor, trade show or publication, other_____

APPENDIX C

PEST MANAGEMENT PROGRAM

PERSONNEL

CERTIFIED PESTICIDE APPLICATORS
FORT JACKSON, SOUTH CAROLINA

Pest Control Company: (Business License Number and Categories)

Name: Gregory Pest Control Business Lic No. B0001491 Exp Date: 31 Dec 2008 Categories : 2,3,5,6,7A,7B,8
Thornton Michael : Exp. Date : 31 Dec 2008 SC Cert. No. C0010549 Categories : 1C,3,6,7A,8
Dyson, Robbie : Exp. Date : 31 Dec 2008 SC Cert. No. CA011316 Categories : 1C,3,6,7A,8
Teague, Timothy Exp. Date : 31 Dec. 2008 SC Cert. No. C0011133 Categories : 7A

Pest Control Company (Family Housing): (Business License Number and Categories)

Name: Neighborhood Pest Control Business Lic. No.: B0001816 Exp Date: 31 Dec 2008 Categories : 2,3,5,6,7A,7B,8
Guess, Alfred Exp. Date : 31 Dec 2008 SC Cert. No. CA007946 Categories : 7A

Fort Jackson Golf Club:

Wallace Martin: Exp Date: 31 Dec. 2008 DOD Cert #: A-017-94-1205 Categories 2,3,5,6

Installation Pest Management Coordinator:

Guinan, James: Exp. Date: 31 Dec, 2009 ; DOD Cert #: A-166-92-1206; Categories 2,3,5,6,7,8
Exp. 31 Dec, 2008 SC Cert #: N0010812 Categories 2,3,5,6,7A,7B,8

Pest Management Contract Quality Assurance Evaluator:

Guinan, Jim: Exp. Date : 31 Dec, 2009; DOD Cert#: A-166-92-1206 Categories 2,3,5,6,7,8
Exp: 31 Dec, 2008 SC Cert #: N0010812 Categories 2,3,5,6,7A,7B,8

Bristow, Jesse: (Family Housing Contract) Exp. Date : 30 Apr. 2011 DOD Cert. No. A-072-93-0408 ; Categories : 3,5,6,7,8

DPW, Wildlife Section:

Hendrick, Richard: Exp Date: 31 Dec, 2008 DOD Cert #: A-620-97-1205 Categories: 2,3,5,6,7,8

DLE, Forestry Section:

Quarles, Theodore R.: Exp Date: 31 Jul. 2011 DOD Cert #: A-216-05-0708 Categories: 2,3,5,6

APPENDIX D
PUP

U.S. Army Pesticide Use Proposal

Installation	Jackson
Fiscal Year	2009
Submission Date	10/01/08

Pesticide	Active ingredient(s) and (% AI)	Formulation	Target pest (s)	Target Area	EPA Reg. #
Advance Ant Bait	Abamectin (0.011)	Bait	Ant, Fire Ants, Carpenter Ants	In/around buildings	499-370
Agnique MMF	Poly(oxy-1,2-ethanediyl,α-isooctadecyl-ω-hydroxyl (100%)	Solution	Mosq Larvae	Cantonment areas	53263-28
Altosid	Methoprene (8.62)	Pellet	Mosq Larvae	Cantonment areas	2724-375
Altosid LL	Methoprene (20.0)	Solution	Mosq Larvae	Cantonment areas	2724-446
Altosid Pellets	Methoprene (4.25)	Pellet	Mosq Larvae	Cantonment areas	2724-448
Altosid XR	Methoprene (2.1)	Pellet	Mosq Larvae	Cantonment areas	2724-421
Amdro	Hydromethylnon (0.73)	Bait	Fire Ants	Outdoors	241-322
Avert	Abamection (0.0500)	Bait	Roaches	In/around buildings	499-294
Award Fire Ant Bait	Fenoxycarb (1.0)	Bait	Fire Ants	In/around buildings	100-722
Bactimos Briquets	Bti (10.31)	Pellet	Mosq Larvae	Cantonment areas	6218-47
Bora-Care	Disodium borate (40.0)	Solution	Termites	All wood structures and new construction.	64405-1
Catalyst	Propetamphos (18.9)	Emulsion	Gen Household Pests	In/around buildings	2724-450
Conserve SC	Spinosad (11.6)	Emulsion	Defoliators	Cantonment areas	62719-291
Cy-Kick	Cyfluthrin (0.1)	Aerosol	Roaches	Indoors	499-470
Cynoff 2E	Cypermethrin (24.8)	Emulsion	Gen Household Pests	Indoors/Outdoors	279-3081
DeltaDust	Deltamethrin (0.05)	Dust	Gen Household Pests	In/around buildings	432-772

DeltaGard G	Deltamethrin (0.1)	Granular	Gen Pests Outdoors	Outdoors	432-836
Extinquish Fire Ant Bait	Methoprene (0.5)	Bait	Fire Ants	In/around buildings	2724-475
FireStar Fire Ant Bait	Fipronil (0.00015)	Bait	Fire Ants	In/around buildings	432-1219
Gentrol	Hydropene (90.6)	Emulsion	Roaches	Indoors	2724-469
Golden Malrin	Methomyl (1.0) Tricosene (0.049)	Bait	Filth Flies	Outdoors	2724-274
Insect Repellent	DEET (31.58)		Mosq-Adults, Ticks	Outdoors	58007-1
Maxforce Roach Killer Bait Gel	Hydromethylnon (1.0)	Bait	Ants	Indoors	64248--14
Maxforce Ant Bait	Fipronil (0.0001)	Bait	Ants	In/around buildings	3215-573
Niban Bait/FG	Boric acid (5.0)	Bait	Roaches, ants	In/around buildings	64405-2
Nylar IGR	Nylar (1.3)	Emulsion	Fleas, Roaches	Indoors	11715-307-57076
Perma-Dust	Boric acid (35.5)	Aerosol	Gen Household Indoor Pests	Indoors	499-384
Permanone 10% EC	Permethrin (10.0)	Emulsion	Mosq-adults	Cantonment areas	432-1132
Permanone Ready-to-Use	Permethrin (3.98) Piperonyl butoxide (8.48)	Emulsion	Mosq-Adults	Cantonment areas	432-1182
Pre-empt Cockroach Gel Bait	Imidacloprid (2.15)	Bait	Roaches	Indoors	3125-525
QuickStrike	Nithiazine (1.0)	Bait	Filth Flies	Outdoors	2724-461
Saga	Tralomethrin (40.0)	Suspension	Gen Indoor & Outdoor Pests	Indoors/Outdoors	432-755
Sevin 80S	Carbaryl (80.0)	Suspension	Gen Outdoor Pests	Cantonment areas/Outdoors	264-316
Suspend SC	Deltamethrin (4.75)	Suspension	Gen Indoor & Outdoor Pests	Indoors/Outdoors	432-763
Talstar One	Bifenthrin (7.9)	Emulsion	Gen Indoor and Outdoor Pests	Indoors/Outdoors	279-3206

Talstar PL Granular	Bifenthrin (0.2)	Granular	Gen Outdoor Pests	Outdoors	279-3168
Tempo Ultra SC	Cyfluthrin (11.8)	Emulsion	Gen Indoor and Outdoor Pests 1	Indoors/Outdoors	3125-498
Termidor 80 WG	Fipronil (80.0)	Suspension	Termites	All wood structures and new construction.	432-900
Termidor SC	Fipronil (9.1)	Emulsion	Termites	All wood structures and new construction.	432-901
Tim-Bor	Disodium borate (98.0)	Solution	Wood-destroying Pests	All wood structures and new construction.	64405-8
Top Choice	Fipronil (0.0143)	Granular	Fire ants	In/around buildings	432-1217
ULD BP-100	Pyrethrin (1.0) Piperonyl butoxide (2.0) N-octyl bicycloheptene dicarboximide (2.94)	Solution	Gen Indoor Pests and Mosq Adults	Indoors	499-452
ULD BP-300	Pyrethrin (3.0) Piperonyl butoxide (6.0) N-octyl bicycloheptene dicarboximide (10.0)	Solution	Gen Indoor Pests and Mosq Adults	Indoors	499-450
Ultracide	Pyriproxyfen (0.1) Pyrethrin (0.05) Permethrin (0.4) N-octyl bicycloheptene dicarboximide (0.4)	Aerosol	Fleas	In/around buildings	499-404
Wasp-Freeze PT515	d-trans allethrin (0.129) cycloproponecarb oxylate (0.129)	Aerosol	In/around buildings	Outdoors	499-362
Contrac	Bromadiolone (0.005)	Bait	Rodents	In/around buildings	12455-69
Talon-G	Brodifacoum (0.005)	Bait	Rodents	In/around builidings	10182-336, 10182-335
WeatherBlok	Brodifacoum (0.005)	Bait	Rodents	In/around buildings	10182-339
Arsenal	Imazapyr (27.6)	Emulsion	Right of Way Plants	Cantonment areas	241-273

BK-800	2,4-D (32.45) 2,4-DP (15.90) dicamba (5.38)	Emulsion	Broad-leaf, Brush, Kudzu	Cantonment areas	2217-758
Garlon 3A	Triclopyr (44.4)	Emulsion	Brush and Broad-leaf	Cantonment areas	62719-37
Garlon 4 Forestry	Triclopyr (61.6)	Emulsion	Kudzu, Brush, & Broad-leaf	Cantonment areas	62719-40
Hyvar XL	Bromacil (21.9)	Emulsion	Allveg	Outdoors	352-346
Manage	Halosulfuron-methyl (75.0)	Suspension	Nutsledge grass	Outdoors	524-465
MSMA	Monosodium Methanarsonate (48.0)	Emulsion	Grasses	Outdoors	9779-133
MSMA 6 Plus	Monosodium Methanarsonate (47.6)	Emulsion	Grasses	Outdoors	5905-164
Oust	Sulfometuron (75.0)	Suspension	Allveg	Outdoors	352-401
Poast	Sethoxydim (18.0)	Emulsion	Grasses	Outdoors	7969-58
Reward	Diquat (36.4)	Emulsion	Allveg and Aquatic Weeds	Outdoors	10182-404
Rodeo	Glyphosate (53.8)	Emulsion	Aquatic Weeds	Lakes and Ponds	524-343
Round-up Pro or Ultra	Glyphosate (41.0)	Emulsion	Allveg	Outdoors	524-475
Suflan A.S.	Oryzalin (40.4)	Emulsion	Grasses and broad-leaf	Outdoors	62719-113
Tordon K			Brush	Outdoors	62719-17
Trimec Classic	2,4-D (25.93) 2,4-DP (6.93) dicamba (2.76)	Emulsion	Broad-leaf	Outdoors	2217-543
Trimec Plus	2,4-D (5.83) 2,4-DP (2.93) dicamba (1.46) MSMA (18.0)	Emulsion	Grasses and Broad-leaf	Outdoors	2217-709
Vantage	Sethoxydim (13.0)	Emulsion	Grasses	Outdoors	7969-88-51036
Vanquish	Diglycolamine (56.8)	Emulsion	Broad-leaf,	Outdoors	100-884
			Brush & Kudzu		

Velpar L	Hexazinone (25.0)	Emulsion	Forestry	Outdoors	352-392
Velpar ULW	Hexazinone (75.0)	Granular	Forestry	Outdoors	352-450
Avitrol	4-aminopyridine (1.0)	Bait	Birds	Outdoors	11649-5
Geese Flight Control	9,10 anthroquinone (50.0)	Solution	Birds	Outdoors	69969-1
Dr. T's Snake-A-Way	Naphthalene (7.0) Sulfur (28.0)	Granular	Snakes	Cantonment areas/Ranges	58630-1
Acephate 75 SPAG	Acephate (75.0)	Suspension	GC Insects	Turf Grasses on Golf Course	51036-236
Amdro	Hydramethylnon (0.73)	Bait	GC Fire Ants	Turf Grasses on Golf Course	241-322
Award Fire Ant Bait	Fenoxycarb (1.0)	Bait	GC Fire Ants	Turf Grasses on Golf Course	100-722
Chipco Choice	Fipronil (0.1)	Granular	GC Insects	Turf Grasses on Golf Course	432-896
DeltaGard G	Deltamethrin (0.1)	Granular	GC Insects	Turf Grasses on Golf Course	432-836
Merit 75 WSP	Imidacloprid (75.0)	Suspension	GC Insects	Turf Grasses on Golf Course	3125-439
Orthene TTO	Acephate (97.0)	Suspension	GC Insects	Turf Grasses on Golf Course	59639-91
Scimitar GC	Lambda-cyhalothrin (9.7)	Emulsion	GC Insects	Turf Grasses on Golf Course	100-1088
Talstar Lawn & Tree Flowable	Bifenthrin (7.9)	Suspension	GC Insects	Turf Grasses on Golf Course	279-3162
Talstar GC Granular	Bifenthrin (0.2)	Granular	GC Insects	Turf Grasses on Golf Course	279-3167
Tempo SC Ultra	Cyfluthrin (11.8)	Emulsion	GC Insects	Turf Grasses on Golf Course	3125-498
Acclaim Extra	Fenoxaprop-p-ethyl (6.59)	Emulsion	GC Weeds	Turf Grasses on Golf Course	432-950
Aquashade	Acid blue no. 9 (23.63) Acid yellow #23 (2.39)	Solution	GC Weeds – Aquatic	Turf Grasses on Golf Course	33068-1
Barricade 65WG	Pridiamine (65.0)	Suspension	GC Weeds	Turf Grasses on Golf Course	100-834
Basagran	Bentazo (42.0)	Solution	GC Weeds	Turf Grasses on Golf Course	7969-45

Cutless 50W	Flurprimidol (50%)	Solution	GC Grass IGR	Turf Grasses on Golf Course	62719-55
Dimension	Dithiopyr (12.7)	Emulsion	GC Weeds	Turf Grasses on Golf Course	707-245
Image 70DG	Imazaquin (70.0)	Suspension	GC Weeds	Turf Grasses on Golf Course	241-319
Kerb WSP	Pronamide (51.0)	Suspension	GC Weeds	Turf Grasses on Golf Course	707-159
Manage	Halosulfuron-methyl (75.0)	Suspension	GC Weeds	Turf Grasses on Golf Course	524-465
Manor	Methsulfuron	Water Dispersible Granule	GC Weeds	Turf Grasses on Golf Course	228-373
MSMA 6 Plus	MSMA (47.6)	Emulsion	GC Weeds	Turf Grasses on Golf Course	19713-42-2269
MSMA 6.6	MSMA (52.8)	Emulsion	GC Weeds	Turf Grasses on Golf Course	42750-28-72112
Oust	Sulfometuron (75.0)	Suspension	GC Weeds	Turf Grasses on Golf Course	352-401
Primo Liquid	Trinexapac-ethyl (12.0)	Suspension	GC Weeds	Turf Grasses on Golf Course	100-729
Primo WSB	Trinexapac-ethyl (25.0)	Suspension	GC Grass IGR	Turf Grasses on Golf Course	100-752
Reward	Diquat (36.4)	Emulsion	GC Weeds & Aquatic plants	Turf Grasses on Golf Course	10182-404
Rodeo	Glyphosate (53.8)	Emulsion	GC Aquatic Weeds	Turf Grasses on Golf Course	524-343
Ronstar G	Oxadiazinon (2.0)	Granular	GC Weeds	Turf Grasses on Golf Course	432-886
Ronstar 50WSP	Oxadiazinon (50.0)	Suspension	GC Weeds	Turf Grasses on Golf Course	432-893
Round-up Ultra (or Pro)	Glyphosate (41.0)	Emulsion	GC Weeds	Turf Grasses on Golf Course	524-475
Round-up Ultra Dry	Glyphosate (71.4)	Suspension	GC Weeds	Turf Grasses on Golf Course	524-504
Scythe	Pelargonic acid (60.0)	Emulsion	GC Weeds	Turf Grasses on Golf Course	53219-7

Sencor 75 DF	Metribuzine (75.0)	Dry Flowable	GC Weeds	Turf Grasses on Golf Course	3125-325
Surflan A.S.	Oryzalin (40.4)	Emulsion	GC Weeds	Turf Grasses on Golf Course	62719-113
Trimec Classic	2,4-D (25.93) 2,4-DP (13.85) dicamba (2.76)	Emulsion	GC Weeds	Turf Grasses on Golf Course	2217-543
Trimec Plus	2,4-D (5.83) 2,4-DP (5.86) dicamba (1.46) MSMA (18.0)	Emulsion	GC Weeds	Turf Grasses on Golf Course	2217-709
Turf Max MSMA 6+	MSMA (47.8)	Emulsion	GC Weeds	Turf Grasses on Golf Course	42750-29-72112
Algean-X	Disinfectant	Emulsion	GC Turf Disease	Turf Grasses on Golf Course	58044-3-58185
Banner MAXX	Proiconazole (14.3)	Water Soluble Packets	GC Turf Disease	Turf Grasses on Golf Course	100-741
Bayleton 50	Tridimefon (50.0)	Solution	GC Turf Disease	Turf Grasses on Golf Course	3125-491
Curalan DF	Vinclozolin (50.0)	Water Dispersible Granule	GC Turf Disease	Turf Grasses on Golf Course	7969-85
Daconil Ultrex	Chlorothalonil (82.5)	Flowable Powder	GC Turf Disease	Turf Grasses on Golf Course	50534-202
Dithane F-45	Mancozeb (37.0)		GC Turf Disease	Turf Grasses on Golf Course	707-156
Eagle WSP	Myclobutanil (40.0)	Suspension	GC Turf Disease	Turf Grasses on Golf Course	707-232
Fore WSB	Mancozeb (80.0)	Suspension	GC Turf Disease	Turf Grasses on Golf Course	707-240
Fungo 50 WSB	Thiopanate-methyl (50.0)	Suspension	GC Turf Disease	Turf Grasses/Golf Course	58185-30
Heritage	Azoxystrobin (50.0)		GC Turf Disease	Turf Grasses/Golf Course	10182-408

ProStar 70WP	Flutolanil (70.0)	Suspension	GC Turf Disease	Turf Grasses on Golf Course	432-1223
Rubigan A.S.	Fenarimol (11.6)		GC Nematodes	Turf Grasses on Golf Course	62719-142
Curfew	1,3-dichloropropene		Grasses and Weeds	Turf Grasses on Golf Course	62719-32
Plateau	Ammonium sallt of imazapic (23.6)	Solution	Aquatic Weeds	Lakes and Ponds	241-365
Sonar Q	Fluridone (5)	Solution	Aquatic Weeds	Lakes and Ponds	67690-3
Sonar PR	Fluridone (5)	Solution	Aquatic Weeds	Lakes and Ponds	67690-12
Renovate 3	Triclopyr (44.4)	Solution	Aquatic Weeds	Lakes and Ponds	62719-37-67690
Pronone Power Pellet	Hexazinone (75)	Granular	Weeds and Brush	Turf Grasses on Golf Course	33560-41
Pendulum 3.3 EC	Pendimethalin (37.4)	Solution	Grasses and Weeds	Turf Grasses on Golf Course	241-341
Pendulum 2G	Pendimethalin (2.0)	Granular	Grasses and Weeds	Turf Grasses on Golf Course	241-375
2,4-D Granules Navigate	2,4-Dichlorophenoxyacetic acid (27.6)	Granular	Aquatic Weeds	Turf Grasses on Golf Course	228-378-8959
Mirage	Glyphosate (41.0)	Solution	Grasses and Weeds	Turf Grasses on Golf Course	524-445-34704
Amine 4 2,4-D Weed Killer	2,4-Dichlorophenoxyacetic acid (46.5)	Solution	Broadleaf Weeds	Turf Grasses on Golf Course	34704-120

APPENDIX E

PEST

MANAGEMENT

REFERENCES

XI. PEST MANAGEMENT REFERENCES.

A. Federal Laws.

1. The Federal Insecticide, Fungicide and Rodenticide Act (through PL 100-460, 100-464 to 100-526, and 100-532).

2. Title 29, CFR, Current revision, Section 1910, Occupational Safety and Health Standards.

3. Federal Noxious Weed Act [7 U.S.C. 2801-2814]:

4. Food Quality Protection Act (FQPA), 1996, Section 303

5. Endangered Species Act, 1973

6. Food, Drug, and Cosmetic Act

7. Occupational Safety and Health Act, 29 U.S.C 651-678

8. Pollution Prevention Act of 1990, PL 101-508

B. Directives and Instructions

1. Department of Defense Instruction 4150.7, Department of Defense Pest Management Program, 22 April 1996.

2. EO 12856: Federal Compliance with Right-to-Know Laws and Pollution Prevention, 3 August 1993.

3. EO 11987 (Carter, 1980) Exotic Organisms: Control noxious species, prevent restrict introductions. (Revoked by EO 13112, Invasive Species – see below)

4 EO 13112, Invasive Species (Amended by EO 13286, Amendment of Executive Orders, and Other Actions, in Connection With the Transfer of Certain Functions to the Secretary of Homeland Security)

5. EO 12088 Compliance with Pollution Control Standards

Presidential Memorandum, "Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds", subject: using native plants in landscaping, 26 April 1994.

6. AFI 91-202, BASH Reduction Program, 11 June 2003.

C. Regulations.

1. AR 11-34, The Army Respiratory Protection Program, 15 February 1990.

2. AR 40-5, Preventive Medicine, 22 July 2005.

3. AR 200-1, Environmental Protection and Enhancement, December 2007.

4. AR 200-2, Environmental Effects of Army Actions, 23 December 1988.

5. AR 385-32, Protective Clothing and Equipment, February 2000.

6. AR 200-5, Pest Management, October 1999.

7. NGR No. 385-10, Army National Guard Safety Program, 25 November 1983.

D. Technical Manuals.

1. TM 5-629, Weed Control and Plant Growth Regulation, 24 May 1989.

2. Military Pest Management Handbook, Chapters 1-10, with Appendices, available from the Armed Forces Pest Management Board website, http://www.afpmb.org/mpmh/mpmh.pdf

E. Technical Guides from the U.S. Army Center for Health Promotion and Preventive Medicine.

1. No. 116, Guide for Fish Kill Investigations, May 1980.

2. No. 138, Guide to Commensal Rodent Control, December 1991.

3. No. 142, Managing Health Hazards Associated with Bird and Bat Excrement, December 1992.

4. No. 196, Guide to Poisonous and Toxic Plants, July 1994.

5. No. 208, Procedures for Thermal Control of Cockroaches in Army Food Service Facilities, January 1997.

F. Armed Forces Pest Management Board Technical Guides.

1. No. 13, Ultra Low Volume Dispersal of Insecticides by Ground Equipment, December 1999.

2. No. 14, Protective Equipment of Pest Control Personnel, March 1992.

3. No. 15, Pesticide Spill Prevention Management, June 1992.

4. No. 16, Pesticide Fires: Prevention, Control, and Cleanup, June 1981.

5. No. 17, Military Handbook, Design of Pest Management Facilities, 1 November 1991.

6. No. 18, Installation Pest Management Program Guide, March 11 2003.

7. No. 20, Pest Management Operations in Medical Treatment Facilities, September 2002.

8. No. 21, Pesticide Disposal Guide for Pest Control Shops, July 2002.

9. No. 22, Guidelines for Testing Experimental Pesticides on DOD Property, June 2001.

10. No. 24, Contingency Pest Management Pocket Guide, April 15 2002.

11. No. 26, Tick-Borne Diseases, Vector Surveillance and Control, June 1998.

12. No. 27, Stored-Product Pest Monitoring Methods, September 2000.

13. No. 29, Integrated Pest Management In and Around Buildings, July 2003.

14. No. 30, Filth Flies: Significance, Surveillance and Control in Contingency Operations

15. No. 31, Contingency Retrograde Washdowns: Cleaning and Inspection Procedures, December 1993.

16. No. 34, Bee Resource Manual, with emphasis on The Africanized Honey Bee, August 2002.

17. No. 36, Personal Protective Techniques Against Insects and Other Arthropods of Military Significance, April 2002.

18. No. 37, Guidelines for Reducing Feral/Stray Cat Populations on Military Installations in the United States, January 1996.

19. No. 39, Guidelines for Preparing DoD Pest Control Contracts Using Integrated Pest Management

20. No. 40, Methods for Trapping and Sampling Small Mammals for Virologic Testing

21. No. 41, Protection from Rodent-borne Diseases with special emphasis on occupational exposure to hantavirus

22. No. 42, Self-Help Pest Management

23. No. 43, Guide to Pest Surveillance During Contingency Operations

G. Other References, Manuals, Books and Guides.

1. MIL-STD-904B, Guidelines for Detection, Evaluation and Prevention of Pest Infestation of Subsistence, 10 March 2000. (Note! This link takes you to the Defense Standardization Project homepage. Click on "Online Specs." Then go to the "Assist Quick Search" and search for Document ID MIL-STD-904B.)

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2. TB Med 561, Occupational and Environmental Health, Pest Surveillance, June 1992.

3. *Mallis Handbook of Pest Control*, 7th Edition, PCT Books, 4012 Bridge Ave, Cleveland, OH 44113, 1100 pp., $89.00

H. Periodicals.

1. *Pest Control* (Magazine Published Monthly, $22/year), P.O. Box 6215, Duluth, MN 55806-9915.

2. *Pest Control Technology* (Magazine Published Monthly, $30/year), PCT, 4012 Bridge Ave, Cleveland, OH 44113.

3. Pest Management Bulletin, Periodic Publication of U.S. Army Center for Health Promotion and Preventive Medicine, Entomological Sciences Program, Aberdeen Proving Ground, MD 21010-5403 [Phone DSN 584-3613 or Commercial (410) 436-3613].

This is available on the U.S. Army Center for Health Promotion and Preventive Medicine's homepage at http://chppm-www.apgea.army.mil/ento

APPENDIX F

LOCAL AND STATE

POINTS OF CONTACT

APPENDIX F

STATE POINTS OF CONTACT

Corps of Engineers

(803) 751-3124

South Carolina Department of Agriculture

Animal and Plant Health Inspection Service
Plant Protection and Quarantine
Wade Hampton State Office Building
Columbia, SC
Phone: (803) 788-1919

Forestry Commission
5500 Broad River Road
Columbia, SC
Phone: (803) 896-8800

Pesticide Regulation
511 Westinghouse Road
Pendleton,SC
Phone: (864) 646-2150

Department of Health and Environmental Control

Division of Public Health
Bureau of Epidemiology
2600 Bull Street
Columbia, SC
Phone: (803) 898-0861

Department of Natural Resources

Wildlife and Freshwater Fisheries Biology and Management
1000 Assembly Street
Columbia, SC
Phone: (803) 734-3886

Clemson University College of Agricultural, Forestry and Life Sciences Cooperative Extension Services

County: Richland
2020 Hampton Street

County: Lexington
219 E. Main Street

Columbia, SC
Phone: (803) 865-1216

Lexington, SC
Phone: (803) 359-8515

APPENDIX G

NATIONAL AND FEDERAL

RESOURCES AND CONTACTS

APPENDIX G

FEDERAL RESOURCES AVAILABLE TO SUPPORT
THE INSTALLATION PEST MANAGEMENT PROGRAM

ARMY ENVIRONMENTAL CENTER SENIOR PEST MANAGEMENT CONSULTANT

Dr. Steven R. Bennett DSN: 584-1565
Entomologist Comm: (410) 436-1565
U.S Army Environmental Center srbennet@aec2.apgea.army.mil

CHEMTREC (Emergency number) 1-800-424-9300

For assistance in a chemical emergency involving a spill, leak or exposure.

(Non-emergencies only) 1-800-262-8200

For non-emergencies (8:00 a.m. - 7:00 p.m. Central Time)

NATIONAL PESTICIDE TELECOMMUNICATIONS NETWORK 1-800-858-7378

Provides up-to-date technical reference material on toxicity, human and environmental health effects, disposal, and proper use of each pesticide.

DEPARTMENT OF DEFENSE (DOD)

Armed Forces Pest Management Board (AFPMB)

The mission of the AFPMB is to recommend policy, provide scientific advice, and enhance coordination among the DOD components on all matters related to pest management. The AFPMB approves introduction, stockage, and deletion of pest management material in the DOD supply system; coordinates and develops requirements for pest management related research and testing within DOD; and operates the Defense Pest Management Information Analysis Center (DPMIAC). DPMIAC maintains a military entomology and pest management information data base. Scientific information pertinent to the military pest management program is indexed, abstracted, stored, analyzed, disseminated, and retrieved on request.

Armed Forces Pest Management Board
Forest Glen Section
Walter Reed Army Medical Center
Washington, DC 20307-5001

DSN: 295-7476
Comm: (301) 295-7476 Fax: 7473

Defense Pest Management Information Analysis Center

A 24 hour telephone recorder for information about Armed Forces Pest Management Board information and publications such as Technical Information Memorandum and the Technical Information Bulletins.

DSN: 295-7479
Comm: (301) 295-7479
Fax: 7483

U. S. Army Center For Health Promotion and Preventive Medicine (USACHPPM)

The pest management program is responsible for providing technical assistance and support in all aspects of vector borne disease, pesticides, and integrated pest management. USACHPPM maintains laboratories and a staff of military and civilian entomologist and technicians for the purpose of providing assistance to the Army pest management community. USACHPPM operates the DOD Pesticide Hotline, produces technical guides, identifies arthropods, provides resistance test kits, and performs resistance testing. Examples of on-site services provided are: Pest Management Program Reviews, MEDCOM Pest Management Assistance Visits, Pest Resistance Evaluations, Lyme Disease Risk Assessments, Environmental Compliance Audits, and Pesticide Risk Management Studies. Other services are available by request and are tailored to the needs of the requesting organization.

COMMANDER
USACHPPM
ATTN: MCHB-DC-OEN
Aberdeen Proving Ground, Maryland 21010-5422

(For information concerning federal pesticide information, EPA or state registered pesticides and pesticide labels.)

DOD Pesticide Hotline DSN: 584-3773
Comm: (410) 671-3773
FAX: 2037

USACHPPM-South

ENTOMOLOGICAL SCIENCES DIVISION
ATTN: MCHB-AS-ES
CDR USACHPPM-SOUTH
1312 COBB ST SW
FT MCPHERSON GA 30330-1075

DSN: 367-2564/2578
Comm: (404) 464-2564/2578 FAX: 3052

Army Medical Department Center and School (AMEDD C&S)

The Medical Zoology Branch of the AMEDD C&S is the Army's designated center for DoD pest management certification training. It provides training to enlisted, officer, and civilian personnel and is involved in development of educational materials, including videos and graphic aids. The Branch also provides technical input to pest management correspondence courses.

Army Medical Department Center and School

Preventive Medicine Division, Medical Zoology Branch
ATTN: HSHA-MP
Fort Sam Houston, TX 78234-6142

DSN: 471-5270/4278
Comm: (210) 221-5270/4278
Fax: 5948

Walter Reed Army Institute of Research (WRAIR)

The Department of Entomology, WRAIR, implements an extensive program of basic and applied research on vectors of arthropod-borne diseases of military significance. Major areas of emphasis include: 1) design and evaluation of improved methods of biosystematics to include vector genetics, molecular taxonomy, and development and production of computerized interactive taxonomic keys for use by far-forward deployed preventive medicine personnel; 2) selection and development of rapid assays for detection and identification of parasites in vectors; 3) identification of arthropods responsible for transmission of infectious diseases and maintenance of reference insect collections of important vectors; 4) investigation of parasite vector host interactions and risk factors for prediction and disruption of natural transmission cycles; 5) culturing of malaria and *Leishmania* parasites and development of animal models to support vaccine development and diagnostics studies; 6) investigation of repellent mechanisms and optimization, composition, formulation and delivery of candidate repellents; 7) preparation of field sites for vaccine, drug, and repellent testing, and 8) design and evaluation of integrated vector control measures for preventing diseases.

Walter Reed Army Institute of Research
Department of Entomology
Building 40, Room 1089
Washington, DC 20307-5100

DSN: 291-3719
Comm: (202) 782-3719
Fax: 4598

DEPARTMENT OF THE INTERIOR

U.S. Fish and Wildlife Service Regional Office

Region 4
1875 Century Boulevard
Atlanta, GA 30345
(404) 679-4000

U.S. Fish and Wildlife Service – Charleston Field Office
176 Croghan Spur Road, Suite 200
Charleston, S.C. 29407
(843) 727-4707

DEPARTMENT OF AGRICULTURE

U.S. Forest Service, Southern Region (8)
USDA Forest Service, FPM

1720 Peachtree Street NW
Room 925N
Atlanta, Georgia 30367

Comm: (404) 347-2961

Animal Plant Health Inspection Service (APHIS), Wildlife Services

APHIS Wildlife Services
400 Northeast Drive
Suite L
Columbia, SC 29203-5182

Comm: (803) 786-9455

Animal Plant Health Inspection Service, Plant Protection and Quarantine

State Plant Health Director
322 Knapp Boulevard, Suite 101
Nashville, TN 37217

Comm: (615) 781-5477
FAX: (615) 399-3026

Animal Plant Health Inspection Service, Plant Protection and Quarantine

Port of Memphis
Port Director
Allen O'Hara building
3385 Airways Blvdl, Suite 217
Memphis, TN 38116

Comm: (901) 544-4212
FAX: (901) 346-2766

USDA-ARS Southern Weed Science Laboratory

Charles T. Bryson, Botanist
Experiment Station & Lee Roads
P.O. Box 350
Stoneville, MS 38776

Comm: (662) 686-5272
Fax: 5422
cbryson@ag.gov

USDA, Natural Resources Conservation Office

USDA-NRCS South Carolina State Office
Strom Thurmond Federal Building
1835 Assembly Street Room 950
Columbia, SC 29201

Phone: (803) 253-3935
Fax: (803) 253-3670

U.S. Environmental Protection Agency, Region IV Office

United States Environmental Protection Agency, Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street SW
Atlanta, GA 30303-8960

Phone: (404) 562-9900 Toll Free: 1-800-241-1754
Fax: (404) 562-8174

Agency for Toxic Substances and Disease Registry (ATSDR) / Waste Management

Region 4 Office
ATTN: ATSDR
United States Environmental Protection Agency, Region 4
Sam Nunn Atlanta Federal Center
Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303

Phone: (404) 562-8651

National Institute for Occupational Safety and Health (NIOSH)

NIOSH Regional Office
1600 Clifton Road Room 4505 MS E-20
Atlanta, Ga 30333

Phone: (404) 498-2500

APPENDIX H

PROCUREMENT

OF

PEST CONTROL

SERVICES

Pest Control Performance Work Statement

for IMPAC Credit Card Holders

Whereas pest control services are required on US Government property, these services are under the oversight of the Department of Defense and United States Army.

Pest control services are required at _____ (building/site) for control of _____.
Contractor providing pest control services for this building or site shall:

1. Comply with all Federal, Army and local Laws, Regulations, Directives and Policies related to providing pest management services. Comply with the Ft Jackson Pest Management Plan for the control pest infestations.

2. Provide pest control services to the satisfaction of the manager of facility requiring services. Resolve specific pest infestations within 30 days of initiations of pest control services.

3. Ensure all personnel who apply pesticides are certified in those pest management categories necessary to complete the pest control task.

4. Conduct a survey of site and identify pest prior to the application of pesticides. Non-chemical control methods shall be utilized to the maximum extent possible.

5. Do not schedule routine or preventive pesticide treatments. These treatments are prohibited unless each treatment or application is approved by the Ft Jackson Pest Management Coordinator (see attached data sheet for name and phone number).

6. Apply only those pesticides identified in the attached list for the control of those pests, so specified. Utilize the minimum pesticide necessary to resolve pest infestation. However, do not apply pesticides at rates lower than those specified on the pesticide label. Contact the Ft Jackson Pest Management Coordinator for approval of any new pesticide prior to its usage in a government facility.

7. Record and report all pest control services to the facility manager on the attached Pest Control Services Data sheet.

8. Do not apply residual pesticides to building interiors while occupied. Non-intrusive pest control methods, such as baits, traps or other non-chemical control techniques are permitted within occupied buildings. Schedule pest control services for the least disruption of facilities activities.

9. Secure pesticides in pest control vehicle when not being used.

10. Inform the facility manager of any pesticide spill. Any spill of hazardous material shall be cleaned and decontaminated at Contractor's expense.

11. Correct any deficient pest control work within one workday of discovery.

CONTRACTOR		**FACILITY MANAGER**	
_____		_____	
Name			
Company	Date	Facility	Date

PEST CONTROL SERVICES DATA

Service Date_____

Location_____ Site Information_____

Target Pest(s)_____

Survey Method_____

Pest Population Observed_____ Threshold Exceeded: Y/N

Non-Chemical Control Method Used_____

Pesticide Application:

Pesticide (Concentrate or Ready-to-Use)

Trade Name_____

Active Ingredient(s) and %_____ _____%

_____ _____%

_____ _____%

EPA Registration Number_____

Quantity Mixed (concentrate) or Used (Ready-to-Use)[1]_____oz/gal/lbs

Diluted and Ready-to-Use Pesticide

% active ingredient as applied_____% (total of all)

Quantity of Finished Pesticide Applied_____

Application Rate_____

Size of Treatment Area_____

Pesticide Applicator Name_____ License #_____

Man Hours Used_____ Category(s)_____

Pest Control Company_____ License #_____

When completed please send to: Jim Guinan , Installation Pest Management Coordinator
DLE Contract Management Branch
Bldg. 2604
Fort Jackson, SC 29207
For further information call (803) 751-6722

PESTS AND PESTICIDES FOR CONTROL
ON FORT JACKSON AND US ARMY PROPERTIES

MOSQUITO – Larvae

Agnique MMF
Altosid
Altosid LL
Altosid Pellets
Altosid XR
Bactimos Briquets
Vectolex-CG

MOSQUTIO – Adults

Aqua-Reslin
Bio-Mist 1.5 + 7.5
Pyna-Fog 100
Mosquito Beater
Permanone 10% EC
Scourge 4+12
Scourge 18+56
ULD BP-100
ULD BP-300

FIRE ANTS

Award Fire Ant Bait
Maxforce Fire Ant Bait
Amdro
Top Choice
Plus products listed below for general arthropod control in and around buildings

TERMITES

Bora-Care
Dursban TC
Premise
Termidor 80WG
Termidor SC
Tim-Bor
Dragnet FT

FILTH FLIES

Golden Malrin
Stimukil Fly Bait
Plus products listed below for general arthropod control in and around buildings

BEES & WASPS

Wasp-Freeze PT515
Plus products listed below for general arthropod control in and around buildings

GENERAL ARTHROPOD CONTROL IN AND AROUND BUILDINGS

Advance Ant Bait
Affront
Borid
Catalyst
CB-80 Extra
Cynoff 2E
DeltaDust
DeltaGard
Demand CS
Drax Ant Bait
Drione Dual Choice Ant Bait
Gentrol
Kicker
Maxforce FG
Maxforce Roach Bait
Maxforce Gel
Niban Bait
Nylar IGR
PCO Fogger
Perma-Dust P.I. Contact
Precor Plus Fogger
PT565 Plus XLO
Roach Kill
Saga
797-A
Suspend SC
Tempo Ultra SC
ULD BP-100
ULD BP-300
Ultracide

RODENTS (mice/rats)

Contrac
Ditrac
Fastrac
Final Blox
Talon-G
WeatherBlok
Fastrac All Weather Blox

ALL VEGETATION (bare ground)

Arsenal	Hyvar XL	Krovar IDF	
Oust	Escort	Outrider	
Reward	Round-up Pro/Ultra	Round-up Ultra Max	
Round-up Ultra Dry	Sahara DG	Karmex DF	
Turftron 777			

PRE-EMERGENT HERBICIDE

Balan DF	Banvel-720	
Surflan A.S.	MSMA	

SELECTIVE POST-EMERGENT (grasses)

Poast	MSMA	Trimec Plus

PLANT GROWTH REGULATOR

Embark	Cutless	Primo

BRUSH & FORESTRY

Garlon 3A	Garlon 4	Arsenal
Vanquish	Weedar 64	

AQUATIC WEEDS & ALGAE

Reward	Rodeo	Aquashade

WEEDS IN AND AROUND ORNAMENTAL PLANT BEDS

Dyclomec	Oust	Pennant
Poast	Reward	Round-up Pro/Ultra
Round-Up Ultra Max	Round-Up Ultra Dry	Surflan A.S.

APPENDIX I

SELF-HELP

PEST CONTROL MATERIALS

APPENDIX I

SELF-HELP PEST CONTROL MATERIALS

The items listed below are considered appropriate for issue as part of the Fort Jackson U-Do-It program. Any/all substitutions or additions to this list must be approved by the IPMC and the AEC PMC in accordance with DODI 4150.7. Additional guidance can be found in Technical Information Memorandum No.42 "Self-Help Pest Management" from the Armed Forces Pest Management Board.

1. Cockroach and ant control bait traps.

a. Combat (regular size traps) – NSN 6840-01-180-0167.
b. Combat (large size traps) – NSN 6840-01-224-1269.
c. Maxforce – NSN 6840-01-298-1122.
d. Advance Dual Choice - NSN 6840-01-426-5472

2. Cockroach sticky traps – NSN 3740-01-096-1632.

3. Spring mousetrap – NSN 3740-00-252-3384.

4. Wasp/hornet spray - NSN 6840-00-459-2443.
(PT 515 Wasp Freeze & Hornet Killer/Wasp Stopper II Plus/Wasp & Hornet Killer II) (You have to get a special approval from Senior AEC entomologist)

5. Insecticide, D-trans Allethrin and Resmethrin aerosol - NSN 6840-01-067-2137. (Need special approval)

6. Insecticide, Pyrethrin aerosol (PT 565 Plus XLO) - NSN 6840-00-823-7849.(Need special approval)

7. Amdro fire ant bait - NSN 6840-01-287-3913. (Need special approval)

8. Fly swatters - NSN 3740-00-252-3383.

9. Fly sticky tape/ribbon - NSN 3740-01-412-9371.

10. Fly sticky trap cylindrical - NSN 3740-01-412-9363.

11. Incandescent yellow light bulbs – (Local Purchase Item) For exterior use around building entrances to reduce attracting insects to lights at night.

12. Boric acid 99% dust – NSN 6840-00-T01-7478.
**** To be discontinued: Use up existing stocks of this item. Do not re-order.****

NOTES:

1. Prior to issue of any pesticide the proper use and safe handling of the product should be fully explained to the customer

2. All pesticide products must be issued in their original packaging/containers with a complete product label attached.

3. Information sheets covering common pests found in and around family quarters can be found in Appendix C of TIM 42.

4. These sheets are designed to be duplicated and given out as customer handouts.

SELF-HELP, FORT JACKSON

Listing of Self-Help Pest Control Materials

1. Ant/Roach Spray
2. Ant Motel Bait
3. Roach Motel Bait
4. Fireant Killer
5. Wasp Spray
6. Rat Traps

APPENDIX J

DOD ARTHROPOD

REPELLENT SYSTEM

APPENDIX J

Sprayers are not part of the repellent system

DEPARTMENT OF DEFENSE ARTHROPOD REPELLENT SYSTEM

NSN (NATIONAL STOCK NUMBER)	NOMENCLATURE	UNIT OF ISSUE
6840-00-142-8965	Insect repellent, personal application, approximately 30% deet (varies based on item currently being stocked) Item approved for flight vest	12 1-oz cartridges/box (varies based on item being stocked)
6840-01-137-8456	Insect repellent, personal application, 3% benzocaine, 10% precipitated sulfur (Chigg-Away)	118-ml bottle
6840-01-278-1336	Insect repellent, clothing application, aerosol, 0.5% permethrin (Permethrin Arthropod Repellent)	12 6-oz cans/box
6840-01-284-3982	Insect repellent, personal application (3M /EPA 58007-1), 33% deet	12 2-oz tubes/box
6840-01-288-2188	Insect repellent, personal application & sunscreen, approx. 20% deet/SPF 15 (varies based on item currently being stocked)	12 3/4-oz tubes/box (varies based on item being stocked)
6840-01-334-2666	Insect repellent, clothing application, permethrin, 40% liquid (2-gallon sprayer)	12 151-ml bottles/box
6840-01-345-0237	Insect repellent, clothing application, 40% permethrin (IDA)	12 kits/box
		EA

APPENDIX K

FIELD SANITATION

TEAM MATERIALS

APPENDIX K

UNIT FIELD SANITATION TEAM MATERIALS

1. The following section is based upon AR 40-5 and FORSCOM Regulation 700-2. This appendix excerpts parts of the new update of Chapter 3 of FORSCOM Reg. 700-2.

2. **Field Preventive Medicine.** All units with mission assignments on approved contingency plans of FORSCOM force packages will deploy with the expendable items listed in applicable figures 1 through figures 7 (only figure 1 is included for unit level requirements in this excerpt). Non-chemical pest management techniques and good sanitation along with good individual and unit-level preventive medicine measures and practices will be utilized to the maximum extent possible without significantly jeopardizing the mission. Pesticides will be used only when warranted.

a. Local procurement, including field sanitation team procurement, of pesticides for use during contingency operations shall be specifically approved by an Army pest management professional in the area of operations. The approving pest management professional shall send copies of Labels and Material Safety Data Sheets (MSDS's) of locally purchased pesticides to the US Army Center for Health Promotion and Preventive Medicine (USACHPPM), ATTN: MCHB-TS-OEN (Pesticide Hotline), Aberdeen Proving Ground, MD 21010-5422.

b. Recording, Reporting and Archiving Pesticide Use

(1) In accordance with memorandum, Office of the Under Secretary of Defense (Acquisition and Technology), 21 Aug 97, and memorandum, Office of the Assistant Secretary of Defense (Installations Logistics and Environment), 13 Nov 97, any pesticide applications, **excluding** arthropod skin and clothing repellents, performed during military operations by Active and Reserve Component preventive medicine sections and units, and Logistics Civil Augmentation Program (LOGCAP) pest control contractor personnel or other contractor personnel must be recorded, reported and permanently archived. Daily pesticide application records shall be maintained using DD Form 1532-1, "Pest Management Maintenance Record," or a computer generated equivalent. If this is not possible, the same information will be recorded in the unit logbook, staff journal or in a similar expedient manner. Required information includes: 1) Date applied, 2) Area/Site/Building and country where the pesticide was used, 3) Target pest, 4) Pesticides name and EPA registration number, 5) Percent final concentration used, 6) Method of application, 7) Amount used, and 8) Who (name and rank) applied the pesticide.

(2) Copies of all pest management maintenance records shall be forwarded to the US Army Center for Health Promotion and Preventive Medicine (USACHPPM), ATTN: MCHB-TS-OEN (Pesticide Hotline), Aberdeen Proving Ground, MD 21010-5422, for permanent archiving on a monthly basis.

c. Pesticide applicator personnel shall be provided with protective clothing, personal protective devices and equipment (respirators, goggles, face shields, etc.) when working with pesticides which require the use of personal protective equipment.

d. Based on specific mission/contingency requirements, justification to pre-stock other mission essential pest management items will be submitted to CDR, FORSCOM, ATTN: AFMD, Fort McPherson, GA 30330-6000, for approval.

e. All pesticides and/or hazardous materials will be properly handled, labeled, stored, shipped and/or applied/disposed of properly in accordance with all applicable laws and regulations**.**

f. For emergency procurement of pesticides, including repellents and pest management equipment, including pesticide application equipment, and respirators: Contact the Defense Supply Center, Richmond (DGSCR) Emergency Supply Operations Center (ESOC) at DSN 695-4865 [commercial (804) 279-4865] and toll free 1 877-352-2255. This ESOC is staffed 24 hours, 7 days per week.

g. Pesticides, chemicals and vector equipment will be pre-stocked by the units listed below:

Field Sanitation Team (FST) Expendable Items

All company, troop and battery-sized units will pre-stock at home station the following items for use by the FST:

ITEM	NSN	UI	Allowance
Calcium Hypochlorite 6 oz jar (See Note 1)	6810-00-255-0471	BT	1/50 indv
Chest, #3, 30x18x10 Aluminum (See Note 2)	6545-00-914-3480	EA	As Required to move stored items
Chlorination Kit, Water Purification or Chlorination Kit, Water	6850-00-270-6225	KT	1/15 indv
Container, Bait, Rodent (UI contains 6 bait stations)	3740-01-423-0737	BX	1/team
Disinfectant, Food Service (U/I contains 12 packets)	6840-00-810-6396	BX	1/75 indv
Food Thermometer	6685-00-444-6500	EA	1
Gloves, Chemical and Oil Protective	8415-01-012-9294 (size 9) or 8415-01-013-7384 (size 11)	PR	1/150 indv
Goggles, Industrial Non-vented	4240-00-190-6432	EA	1/150 indv
Insect Repellent, Personal Application, 2 oz tube (UI contains 12 tubes)	6840-01-284-3982	BX	4 tubes/indv
Insect Repellent, Clothing Application IDA Kit (UI contains 12 kits)	6840-01-345-0237	BX	2 Kits/indv
Insect Repellent, Clothing Treatment, Aerosol, 6 oz can (UI contains 12 cans)	6840-01-278-1336	BX	1 can/indv & bed net

ITEM	NSN	UI	Allowance
or Insecticide, Demand Pestab 10% Tablets, Unit Dose (UI contains 40 Tabs) (See Note 3)	6840-01-431-3357	CO	1/150 indv
Insecticide, d-Phenothrin 2%, Aerosol, 12 oz	6840-01-412-4634	CN	1/indv
Mouse Trap, Spring Indv (UI contains 12 traps)	3740-00-252-3384	DZ	4dz/150indv
Rat Trap, Spring (UI contains 12 traps)	3740-00-260-1398	DZ	4dz/150indv
Rodenticidal Bait Anticoagulant, 0.005% diphacinone (UI contains 40 bait blocks)	6840-00-089-4664	BX	1/150 indv
Rodenticide Bait Anticoagulant, 0.005% brodifacdoum (Talon-G) (UI is 11 lb can) or Rodenticidal Bait Anticoagulant, 0.005% bromadiolone, (Maki Pellets) (UI is 11 lb can) (See Note 4)	6840-01-426-4804 6840-01-151-4884	CN CN	1/150 indv 1/150 indv
Sprayer, Insecticide, Manually Carried, 2-Gal and Sprayer, Insecticide, Manually Carried, 1-Gal (See Notes 5 & 6)	3740-00-641-4719 3740-00-191-3677	EA EA	1/150 indv 1/150 indv
Swatter, Fly (UI contains 12 fly swatters)	3740-00-252-3383	DZ	12/150 indv

ITEM	NSN	UI	Allowance
Water Purification Tablet, Chlorine (UI contains 10 tablets)	6850-01-352-6129	PG	10/indv
or			
Water Purification Tab 50s, Iodine, 8 MG (UI contains 50 tablets)	6850-00-985-7166	BT	2/indv
Wet Bulb-Globe Temperature (WBGT) Kit	6665-00-159-2218	EA	1/unit

NOTE 1: Calcium Hypochlorite must be stored separate from organic materials. Store Calcium Hypochlorite in individually packed plastic zip lock bags. Place individually packed zip lock bags into a serviceable ammunition can marked with Department Of Transportation (DOT) Oxidizer labels.

NOTE 2: Field Sanitation Team Materials (except NSN 6810-00-255-0471, Calcium Hypochlorite, unless packed in a serviceable ammunition) may be stored in a sealed metal chest or in a footlocker. All materials should be left in their original package whenever possible. If removed from the original package, the materials should be packed into a fiberboard or plywood box and then placed into the sealed metal chest or footlocker.

NOTE 3: Demand Pestab replaces Insecticide, Chlorpyrifos

NOTE 4: Do not prestock Talon-G or Maki because of short shelf-life. Order on a priority basis prior to anticipated deployment. For emergency procurement: Contact the Defense Supply Center, Richmond (DGSCR) Emergency Supply Operations Center (ESOC) at DSN 695-4865 [commercial (804) 279-4865]. This ESOC is staffed 24 hours, 7 days per week.

NOTE 5: Three sets of repair parts should be acquired for each sprayer. Repair parts will include items such as: check valves, pressure cups, filters, O-rings, four way nozzles with crack and crevice tips. Repair parts may be ordered from the sprayer manufacturer by part number as Class IX repair parts.

NOTE 6: All sprayers should be equipped with a pressure gauge. If not order a pressure gauge, NSN 3740-01-332-8746 and filter, NSN 4330-01-332-1639, to retrofit the sprayers.

APPENDIX L

PEST MANAGEMENT

RECORD KEEPING

Reports and Records.

1. Adequate records of all pest management operations performed by contractors or supporting military pest management personnel will be maintained by the local Facility Manager. When pest control operations are accomplished for a structure or an area, record them on the record form, then file the pest management maintenance record for future use. We recommend that you use IPMIS or Pest Management Spreadsheet instead of 1532's. Both these pest management electronic record keeping system can calculate total pound of active ingredients for annual MoM reporting requirement. Please let us know if you are interested in any one of the systems.

2. Contracted pest management personnel record and submit pesticide application and surveillance activity to the Facility Manager. The information received must include the information needed to properly fill out the Pest Management Maintenance Record
(DD Form 1532-1). The contractor can either fill out the DD Form 1532-1 or provide a suitable equivalent.

3. A DD Form 1532-1 will be kept on file for each building in which pest management activity is performed. These forms provide a permanent historical record of pest management operations for each building, structure or outdoor site on every facility.

4. The Pest Management Maintenance Record (DD Form 1532-1) provides a standard method for recording pesticide use and other pest control information. Use of the record complies in part with Federal Regulation 40 CFR 171.11c (7) of the Federal Insecticide, Fungicide and Rodenticide Act, as amended. It is used as a permanent maintenance record and history of pest control operations at a particular site (structure or area). The record also provides continuity in the management and performance of pest control operations at the command level. Use and analysis of these records will identify structures, designs and areas which have significantly more pest problems than others. Historical pest control data can be used to verify warranties, correlate sites and treatment, and to facilitate cost effective pest management.

5. An example of a Pest Management Maintenance Record is attached.

Data Entry on DD Form 1532-1

1. On the top of the record, in the space marked "Bldg/Area", enter the building or structure number when a maintenance record is needed. This number may be found on the installation in the facilities inventory, usually available from the Facility Management Office. Similarly, for outdoor areas to be maintained on record, enter a description or area number, if available. In the next space enter the size of the item to be maintained. A legend at the bottom of the record provides standard measurement units. In the space marked "Type of Construction", enter the code letters from the legend to designate the major type of construction. More than one set of code letters may be used, if desired. In the last space marked "Use Designation", enter information to identify the major use of the building, structure or area.

2. Enter the following information for each pest control operation conducted at the structure or area.

a. Date. Enter the date of the operation in the date column as year, month, and day.

b. Units Serviced and Work Origin. Enter the part of the building involved, such as room or apartment number, or in the case of outdoor areas, a site designation such as “south section of parade ground” or “trees”. Enter also the work origin using the symbols in the legend to show how the work was initiated.

c. Units of Measure. Enter the size of the treated or protected area using the measurement units in the legend.

d. Target Pest. Enter the name of the target pest. Be specific, if possible.

e. Control Operation. Enter information to identify how the control operation was performed (e.g., misting, hand spraying, fogging, trapping).

f. Pesticide use. If pesticide was used, enter the pesticide name and EPA registration number in the first space, enter the concentration of the finished formulation in the middle space, and the amount or quantity used in the last space. If no pesticide was used, leave this section blank.

g. Labor Time. Enter the time required for the pest control operation in this space. Include all time associated with the job, for example: travel preparation, execution and cleanup. Do not include the pretreatment inspection or post-treatment survey.

h. Application Initials. Enter the initials of the individual responsible for performing the work. If more than one person was involved, the crew leader should initial the record.

i. Remarks. Using the date as a cross reference, enter any remarks in this space which pertain to a pest control operation reported on the record. If a diagram of areas treated is desired, it may be put in this space or put on a separate card and attached to the record.

PEST MANAGEMENT REPORT														REPORT CONTROL SYMBOL DD-M(A&AR)1080
NAME OF REVIEWING COMMAND		ADDRESS			NAME OF REPORTING INSTALLATION			ADDRESS						
	TARGET PEST	OPERATION				PESTICIDE								IME
	NAME (a)	NAME (b)	OTAL NITS (c)	NIT d)	ITE e)	NAME (f)	ORM (g)	MNT (h)	NIT i)	INAL ONC (j)	BS k)	(l)	PS m)	OURS (n)
0														
1														
2														
3														
4														
5														

6														
7														
8														
9														

DD FORM 1532

	TARGET PEST	OPERATION				PESTICIDE								TIME
o	NAME (a)	NAME (b)	OTAL NITS (c)	NIT (d)	ITE e)	NAME (f)	ORM g)	MT h)	NIT i)	INAL ONC j)	BS k)	% l)	PS m)	OURS n)
0														
1														
2														
3														
4														
5														
6														
7														
8														
9														
0														

REMARKS	INSTRUCTIONS FOR USE
	1. Detailed instructions of the implementing department directives shall be used in the preparation of this report. 2. Military installations shall prepare this report by the 15th day after each month. The report shall be prepared and signed by the DOD certified pest management supervisor, applicator or inspector, and by the installation engineer. 3. Three copies shall be signed and distributed as follows: a. Copy No 1. To the appropriate pest management professional in accordance with implementing department directives for technical review. b. Copy No 2. Record to the installation surgeon. c. Copy No 3. Record copy to the installation engineer for two-year retention in accordance with public law 92-516.

installation engineer (reviewing officer)			installation certified pest management supervisor, applicator, or inspector		
TYPED NAME	SIGNATURE	DATE (yymmdd)	TYPED NAME	SIGNATURE	DATE (yymmdd)

DD FORM 1532

BUILDING / AREA					IZE	TYPE OF CONS TRUCTION	USE DESIGNATION				
ate	nits erviced	ork rigin	nit of easure	arget est	ontrol peration	If Pesticide is Used				abor ime	pplicator nitials
						Nam e	PA Reg	Conc	mount		
REMARKS											

Form Approved. OMB No. 07404-0188

RCS:DD-P&L (A&AR) 1080

PEST MANAGEMENT MAINTENANCE RECORD

UNITS — **MEASUREMENT**

MSF = 1,000 Sq. Ft.
MCF = 1,000 Cu. Ft.
LFF= Linear Feet
Ac = Acres

ORIGIN OF WORK

SW = Scheduled work
WR = Work Request
SC = Service or Trouble call
R = Routine Inspection

TYPE OF CONSTRUCTION

CO = Concrete
BL = Block
BV = Brick Veneer
ST = Steel, Sheet Metal
WO = Wood
OT = Other

DD Form 1532-1, May 87
USACHPPM SOUTH local version

GOLF COURSE SURVEILLANCE

_____ _____
Month **Year**

Routine Pest Surveillance

Operation	Site	Pest	Manhours
GCSURVEY	GFG	TURF DISEASE	_____ hrs
GCSURVEY	GFG	TURF WEEDS	_____ hrs
GCSURVEY	GFG	TURF INSECTS	_____ hrs
GCSURVEY	GFG	AQUATIC WEEDS	_____ hrs

Pest Problems Observed

Date	Location	Pest	Operation	Results/Remarks	Manhours
			GCSURVEY		_____ hrs
			GCSURVEY		_____ hrs
			GCSURVEY		_____ hrs
			GCSURVEY		_____ hrs
			GCSURVEY		_____ hrs
			GCSURVEY		_____ hrs
			GCSURVEY		_____ hrs
			GCSURVEY		_____ hrs
			GCSURVEY		_____ hrs
			GCSURVEY		_____ hrs
			GCSURVEY		_____ hrs
			GCSURVEY		_____ hrs
			GCSURVEY		_____ hrs

_____ GCSURVEY _____ _____ hrs

_____ GCSURVEY _____ _____ hrs

_____ GCSURVEY _____ _____ hrs

PREVENTIVE MEDICINE SURVEILLANCE

_____ _____
Month **Year**

Routine Pest Surveillance

Operation	Site	Pest	Manhours
MEDSURVEY	FHB	ROACHES	_____ hrs
MEDSURVEY	FHB	RODENTS	_____ hrs
MEDSURVEY	FHB	FILTH FLIES	_____ hrs
MEDSURVEY	POST	MOSQ-ADULTS	_____ hrs
MEDSURVEY	POST	MOSQ-LARVAE	_____ hrs
MEDSURVEY	POST	TICKS	_____ hrs

Requested Pest Inspection or Survey

Date	Location	Pest	Operation	Results/Remarks	Manhours
_____			MEDSURVEY	_____	_____ hrs
_____			MEDSURVEY	_____	_____ hrs
_____			MEDSURVEY	_____	_____ hrs
_____			MEDSURVEY	_____	_____ hrs
_____			MEDSURVEY	_____	_____ hrs
_____			MEDSURVEY	_____	__ _____ hrs
_____			MEDSURVEY	_____	_____ hrs
_____			MEDSURVEY	_____	_____ hrs
_____			MEDSURVEY	_____	_____ hrs
_____			MEDSURVEY	_____	_____ hrs
_____			MEDSURVEY	_____	_____ hrs

_____ MEDSURVEY _____ _____ hrs

_____ MEDSURVEY _____ _____ hrs

_____ MEDSURVEY _____ _____ hrs

VETERINARY SERVICES SURVEILLANCE

_____ _____
Month **Year**

Routine Pest Surveillance

Operation	Location	Site	Pest	Manhours
VETSURVEY		EXC	FOODPESTS	_____ hrs
VETSURVEY		EXC	ROACHES	_____ hrs
VETSURVEY		EXC	RODENTS	_____ hrs
VETSURVEY		EXC	FILTH FLIES	_____ hrs
VETSURVEY		WHS	FOODPESTS	_____ hrs
VETSURVEY		WHS	ROACHES	_____ hrs
VETSURVEY		WHS	RODENTS	_____ hrs
VETSURVEY		WHS	FILTH FLIES	_____ hrs

Pest Problems Observed

Date	Location	Pest	Operation	Results/Remarks	Manhours
_____			VETSURVEY	_____	_____ hrs
_____			VETSURVEY	_____	_____ hrs
_____			VETSURVEY	_____	_____ hrs
_____			VETSURVEY	_____	_____ hrs
_____			VETSURVEY	_____	_____ hrs
_____			VETSURVEY	_____	_____ hrs
_____			VETSURVEY	_____	_____ hrs
_____			VETSURVEY	_____	_____ hrs
_____			VETSURVEY	_____	_____ hrs

_____ VETSURVEY _____ _____ hrs

_____ VETSURVEY _____ _____ hrs

_____ VETSURVEY _____ _____ hrs

_____ VETSURVEY _____ _____ hrs

Applicator's Name **Certification**
Company Name **License**

Month Day Year

Bldg/Site Description	Project Number	ITEM Code	Unit of Measure	Qty Unit	Target Pest	Operation	Pesticide	EPA Reg #	A.I. as applied	QTY Applied	Unit of Measure	Manhours

APPENDIX M

CONTRACT

PERFORMANCE WORK

STATEMENTS

(PWS)

AVAILABLE UPON REQUEST

APPENDIX O

THREATENED

AND

ENDANGERED SPECIES

*(Contact USWFS and SCDNR for Current Lists)

APPENDIX P

MAINTENANCE AND CARE

OF

RESPIRATORS

APPENDIX P

MAINTENANCE AND CARE OF RESPIRATORS

1. PURPOSE. To establish a program for proper maintenance and care of respirators. Respirators shall be properly maintained to retain their original effectiveness.

2. GENERAL. Basic elements of the program are as follows:

a. Inspection for defects.

b. Cleaning and disinfecting.

c. Repair.

d. Storage.

3. PROCEDURES. Only respirators recommended by the National Institute for Occupational Safety and Health (NIOSH) for use with pesticides will be used during pesticide operations. After respirators have become contaminated, each Pest Management Technician will initiate the following procedures:

a. Inspection for Defects. Each respirator shall be checked for tightness of connections and the condition of the face piece and head band. Rubber or elastomer parts shall be inspected for pliability and signs of deterioration.

Note: If a disposable respirator is used during pesticide application, the device should be inspected for defects before reuse during subsequent pesticide applications.

b. Cleaning and Disinfecting.

(1) Remove any filters or cartridges from the respirator.

(2) Wash the face piece in cleaner/disinfectant solution.

(a) Add one package (1 oz.) of powdered MSA Cleaner-Sanitizer (or other suitable cleaner/sanitizer), to a gallon of warm water (about 120° F).

(b) Immerse soiled equipment in the solution and scrub gently with a soft brush until clean. Care should be taken to clean the exhalation valve in the face piece and all other parts that exhaled air contacts.

Note: Respirators contaminated heavily with organophosphate pesticides should also be washed with alkaline soap and rinsed with 50 percent alcohol (ethanol or isopropanol) before normal cleaning procedures.

(3) Rinse completely in clean, warm water.

(4) Air dry in a clean area (preferably overnight).

(5) Place in plastic bag for storage and label as to date cleaned and initialed.

c. Repairs. Replacement of parts or repairs shall be done only with parts designed for the respirator by the manufacturer. No attempt shall be made to replace components or to make adjustments or repairs beyond the manufacturer's recommendations.

d. Storage. After inspection, cleaning, and necessary repairs, respirators shall be stored to protect against dust, sunlight, heat, extreme cold, excessive moisture or damaging chemicals. Pesticide approved respirators will be stored in clean, pesticide-free lockers or other locations.

e. Use. Respirators will be used in accordance with pesticide labels and manufacturer's instructions.

4. REFERENCES.

a. Manufacturer's Instructions.

b. TB MED 502, February 1982, Respiratory Protection Program.

APPENDIX Q

POLLUTION PREVENTION GUIDE

FOR

PEST MANAGEMENT OPERATIONS

APPENDIX Q

**POLLUTION PREVENTION
GUIDE FOR
PEST MANAGEMENT OPERATIONS**

1. Pesticide Inventory.

a. Excess Inventory. Do not maintain or order more pesticide than what is necessary to fulfill the installation's annual pest management work requirements. The work requirements should be established by reviewing previous years' pest management records. Because of the seasonal nature of pests or pest infestations not developing into significant problems to warrant pesticide application(s), pesticides programmed for that pest's control are carried over to the following year or incorporated into control programs for other pest species.

b. Obsolete Materials. Eliminate older serviceable materials in various control programs before they become obsolete. Ensure older materials are utilized prior to using new "state-of-the-art" products and control techniques.

c. Spills and Leaks. Purchase pesticides in smaller, plastic containers that are less likely to spill, rust and leak. Eliminate pesticide inventories, that are carried over from year to year. Deterioration of containers can result from long-term storage.

d. Housekeeping. Store pesticides in an organized manner on shelving or pallets that allows thorough cleaning.

e. Inventory Management. Follow the first-in, first-out inventory management practice. When new product is received, place old product forward on the shelving and the new product in the rear.

2. Pesticide Mixing.

a. Pesticide Dilutions. Incorporate ready-to-use products in the pest management programs. Products include baits, granular and dust formulations and aerosols. Use of these types of pesticides reduces the need for diluting or formulating concentrated pesticides. Use containers of concentrated pesticide that have controlled dosage dispensers, that improve the accuracy of formulation and reduce the cleaning of mixing equipment.

3. Pesticide Application.

b. Timing. Time the application of pesticides to control pests while they are the most susceptible. Targeting immature and susceptible pest populations result in more effective control using lower pesticide application. More effective the initial control results, the longer the interval for the pest population to recover and the need for re-treatment.

c. Appropriate Pesticide Selection for the Site. Select the appropriate pesticide for the site being treated. Usually no one single pesticide or pesticide formulation is best for all treatment sites within a single building or facility. Products and control techniques that easily allow small quantity application improves overall pest control while greatly reducing the quantity of pesticides applied. Utilizing multiple pesticides for maximum effectiveness reduces the development of pesticide resistance.

d. Pesticide Dispersal. Utilize pesticide dispersal techniques that permit the application of small quantities of pesticides into pest harborage sites. A much lower quantity of pesticide is required for a meticulously applied crack and crevice treatment than if the same product was applied as a spot or general surface treatment. Calibrate pesticide dispersal equipment to prevent wasteful over application (a violation of pesticide label laws) or non-effective under application.

e. Equipment Calibration. Ensure all pesticide application equipment delivers the desired rate of application to the intended site.

(1) Equipment calibration is not limited to a through understanding of pesticide application equipment, but includes all operating parameters involving the use of pesticides. Besides equipment usage, pesticide applicators must know the pesticide label requirements, the site being treated and any precautionary measures necessary for potential environmental or safety hazards within the treated area.

(2) Misapplication of pesticides must be avoided. The under application of pesticides is a waste of manpower and pesticides. It results in poor pesticide performance and incomplete pest control, that can create a need for retreatment. Retreatments result in increased pesticide usage and application costs for both manpower and pesticides. However, over application of pesticides is a violation of Federal and State laws and can result in fines and loss of Pest Management Certification (and employment as a pest controller). Misapplication of

pesticides can be avoided by having a complete, accurate, working knowledge of each pesticide application mission, the pesticide and the application equipment.

4. Pesticide Containers.

a. Rinse Water. Triple rinse empty pesticide concentrate containers. Use rinseate as a diluent for the final pesticide formulation as applied. Do not save or collect rinseate from triple rinsing.

b. Disposal of Empty Pesticide Containers. Dispose of all empty pesticide containers in accordance with the pesticide label directions. "THE LABEL IS THE LAW!" Most ready-to-use pesticides cannot be triple rinsed, such as aerosol cans, bait containers, dusts, and granular formulations.

c. Pesticide Container Residue. Ensure that all pesticide containers are classified as empty when disposed. Containers that can be triple rinsed are rinsed and residue added to the application equipment. All other containers, that cannot be triple rinsed are defined as "empty" if they contain only minor residue on the bottom of the container or inner lining. Follow installation's standard for disposal of empty hazardous material containers.

5. Equipment Cleaning.

a. Rinse Water from Equipment Cleaning. Try to clean equipment at the site of application. A small quantity of rinse water from cleaning the exterior surfaces of pesticide application equipment is permitted into the sanitary sewer system of installations having a high volume discharge. Discuss equipment-cleaning requirements with installation personnel responsible for wastewater processing.

b. Cleaning Solvents. Cleaning solvents could potentially be used for flushing fogging machines and neutralizing pesticide residue in spray tanks. Use biodegradable cleaning solvents and apply to treatment site when complete.

c. Laundry of Pesticide Contaminated Clothing. Pesticide contaminated clothing should not be home laundered. Discharge of wash water from normal laundry operations is permitted into the installation's sanitary sewer system. Heavily contaminated clothing should be considered as waste product and be disposed according to the installation's hazardous waste disposal program.

6. Integrated Pest Management Practices. Resolve pest infestations by using all available integrated pest management practices (mechanical, physical, cultural, biological and chemical). Base pest management activities on surveillance results.

APPENDIX R

PESTICIDE APPLICATION

EQUIPMENT

PEST CONTROL & PESTICIDE APPLICATION EQUIPMENT

DIRECTORATE OF LOGISTICS AND ENGINEERING
(Wildlife and Forestry)

Power Sprayer,
Model: Chemical Containers Inc. 50 gal. Skid mounted sprayer
Serial #: 001SK0798-317

Power Sprayer,
Model: Hardee 65 gal. Boom sprayer
Serial #: 0806-HS

PREVENTIVE MEDICINE ACTIVITY

Mosquito Trap w/ CO_2**,**
5 – CO_2 Traps without light
9 – CO_2 Traps with blacklight
3 – New Jersey light traps

Mosquito Magnet, 1 acre size
4 – Mosquito magnets

Gravid Female Trap
4 - Gravid traps

FORT JACKSON GOLF CLUB

Power Sprayer,
Model: Toro Multipro 1100
Serial Number: 41105-90486

Power Sprayer,
Model: Toro Multipro 1100
Serial Number: 30108

Power Sprayer,
Model: Cushman 150
Serial Number: 888457

Power Sprayer,
Model: Flo Jet D21X003B
Serial Number: OE14577

APPENDIX S

TERMITE INSPECTION & TREATMENT FORM

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
US ARMY ENVIRONMENTAL COMMAND
5179 HOADLEY ROAD
ABERDEEN PROVING GROUND, MD 21010-5401

REPLY TO
ATTENTION OF

07 DEC 2009

IMAE-EQN

MEMORANDUM FOR US ARMY GARRISON FORT JACKSON (IMSE-PWN-P/MR. JAMES GUINAN), BLDG 2653, FORT JACKSON, SC 29207-5000

SUBJECT: FY10 Integrated Pest Management Plan for Fort Jackson, SC

1. Reference E-mail, USAEC (IMAE-EQN), Dr. Herbert Bolton, 09 Nov 09, subject: Fort Jackson IPMP 2010.

2. IAW DOD Instruction 4150.07 and AR 200-1, the FY10 Integrated Pest Management Plan for Fort Jackson, SC has been reviewed for technical sufficiency and is validated as of the date of this memorandum. For Army environmental reporting purposes, this validation date must be reported as stated in this memorandum. Recommend the Garrison Commander, or appropriate government authority, approve and implement the plan. Expiration date of this validation is 30 September 2010.

3. Annual revision and update of this plan, or a no change submission will be sent to the US Army Environmental Command (USAEC) for review and validation prior to the expiration date. Plans and annual updates can be transmitted using email (the preferred method) or postal service. Updates must include a Pesticide Use Proposal for the following year.

4. My POC is Mr. Zia Mehr, Pest Management Consultant, USAEC, Environmental Quality Division, commercial (410) 436-1213, DSN 584-1213, e-mail: zia.mehr@us.army.mil

FOR THE COMMANDER:

JANET KIM
Chief
Environmental Quality Division

CF:
USAEC, SOUTHEAST REGION FUNCTIONAL SPT TEAM (IMAE-FS/MR. RUDY STINE), 1593 HARDEE AVE, SW, BLDG 171, FORT MCPHERSON, GA 30330-1057

REGULATION
NUMBER 28-4

Morale, Welfare, and Recreation
HUNTING AND FISHING REGULATION

1. PURPOSE. To establish procedures for governing fishing and hunting on the Fort Jackson Military Reservation.

2. GENERAL. The hunting and fishing statutes, rules and regulations of the State of South Carolina will be observed on the Fort Jackson Military Reservation to the extent that they are not in conf1ict with Fort Jackson regulations or Federal laws or regulations. (See Appendix C, para 2)

3. RESPONSIBILITIES.

a. The Director, Family, Morale, Welfare, and Recreation (FMWR), will be responsible for the overall execution of the Fort Jackson Hunting and Fishing Program in coordination with the appropriate directorates and regulations as follows:

(1) Supervise and coordinate the recreational aspects of the hunting and fishing program in accordance with AR 215-1, and AR 200-1.

(2) Plan, organize, and supervise group hunts as authorized by DA PAM 420-7 and AR 215-1.

(3) Provide special instructions and a list of hunters and fishermen registered, to include name and home telephone number, to the Provost Marshal's game warden.

(4) Establish procedures and monitor disposition of accidentally or illegally killed deer.

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*This regulation supersedes Fort Jackson Regulation 28-4, dated 2005

(5) In coordination with Directorate of Public Works (DPW), establish the method by which antlerless deer tags will be issued to ensure tags are used per DPW deer management prescriptions.

(6) Designate areas available for hunting in coordination with Directorate of Plans, Training, Mobilization and Security (DPTMS) Range Scheduling.

(7) Report violations to the military police.

(8) Receive and process applications for hunting and fishing privileges and maintain appropriate records. For purposes of this regulation the term "permit" is used to describe both the activity fees charged by MWR and the actual license and permit fees charged by DPW and Federal and State agencies.

(9) Provide each hunter and fisherman a copy of this regulation.

(10) Issue each individual with a Vehicle Control Form to be displayed while in the use area.

(11) Provide Fort Jackson Hunter Safety Briefing outlining their hunter safety responsibilities.

b. Director of Public Works (DPW):

(1) Manage game and fish resources on Fort Jackson in accordance with the Integrated Natural Resource Management Plan (INRMP) and in conformance with applicable Federal, State, and local laws and regulations.

(2) Perform habitat improvements. These activities will be accomplished in a manner directed toward the development of native habitats and perennial planting. Planting annual food plots will be avoided as a major activity. Prescribed burning will be utilized to enhance the fire dependent ecosystem and the indigenous wildlife populations associated with it. Fisheries management will emphasize the management of a sustained yield fishery to maximize user satisfaction while minimizing associated costs.

(3) Monitor indigenous and introduced wildlife populations to detect adverse changes of relative abundance, which may lead to overpopulation or jeopardize the continued existence of a species on the installation. Examples include the performance of surveys, collection of harvest data, and sampling of populations. Species abundance and health characteristics will be considered in the monitoring procedures.

(4) Set fish and game harvest limits, strategies and season dates in coordination with the South Carolina Department of Natural Resources (SCDNR) and the U.S. Fish and Wildlife Service.

(5) Recommend population control activities to maintain wildlife populations at levels that do not exceed the carrying capacity of the habitat and to prevent health and safety hazards.

c. Commander, Savannah Rapids Veterinary Services Support District, will:

(1) Provide technical assistance of Veterinary Services to DPW in the assessment of animal health and disease prevention.

(2) As manpower permits, provide assistance in collection and preparation of serum, tissue and organ samples as needed to maintain wildlife health and conduct preventive medicine investigations.

d. Provost Marshal Directorate of Emergency Services (DES) will:

(1) Enforce fishing and hunting laws and regulations. Military Police have the authority to confiscate Fort Jackson hunting and fishing permits of person(s) who are in violation of this regulation. Those Fort Jackson hunting and fishing permits that are confiscated will be filed with the Military Police report and forwarded to the Installation Hearing Officer (IHO) when an appeal is received. State hunting and fishing licenses will not be confiscated.

(2) Provide, within resources, adequate personnel to perform the game warden mission. Game wardens will remain PMO assets but will maintain a close liaison with the DPW Wildlife Branch and Outdoor Recreation personnel to coordinate wildlife and fishing issues.

(3) Conduct patrols to:

(a) Make routine checks of licenses, bag & creel limits, seasonal restrictions, check for unauthorized methods or means of taking fish and game, and establish roadside checkpoints as required.

(b) Cite violators, render reports in accordance with AR 190-45. Offenders will be charged on DD Form 1805 for petty offenses; offenses other than petty offenses will be coordinated with Staff Judge Advocate (SJA) or Assistant United States Attorney for charging. Military personnel may be charged under UCMJ. Provide Outdoor Recreation with violation reports.

(c) Investigate fish and wildlife violations.

(d) Provide information to personnel in the area, i.e., directions, regulations, policies, etc., locate and assist hunters/fishermen in distress (injured/vehicle breakdown, etc.).

(4) Enforce procedures for hunting and fishing in approved areas.

(5) Establish and monitor a hot line operation "Game Thief" for the purpose of Reporting fish and game violations on Fort Jackson. Game Thief Hotline, 751-7002; or Fort Jackson Military Police, 751-3113/3114, or 911.

(6) Transport and dispose of accidentally/illegally killed deer on behalf of FMWR. Deer carcass will be transported to the Big Game Check Station, where edibility will be determined by DES personnel in consultation with Tennessee Valley District Veterinary Command for use by group functions, i.e., hunter potlucks, organizational days, etc. Accidentally/illegally killed deer and any of their parts are not to be utilized for personal gain or consumption.

(7) The Provost Marshal will issue letters of exclusion in accordance with the Installation Commander's guidelines. Affected personnel will have ten calendar days from the initial action to submit a written appeal through the Provost Marshal's office to the Installation Hearing Officer lAW Fort Jackson Regulation 210-2.

(8) Check sign out/in register at Big Game Check Station, building number G-2175, daily, 90 minutes after official sunset to ensure everyone has returned safely from hunting or fishing.

e. Directorate of Plans, Training, Mobilization and Security (DPTMS) will:

(1) Provide Outdoor Recreation each Thursday, NLT 1600, the training areas available for hunting and fishing for Saturday through Friday of the following week. Immediately inform Outdoor Recreation of all unscheduled changes to training schedules to ensure hunters are not posted in closed areas. All changes will be reported through the DPTMS, to the Range Control to Outdoor Recreation.

(2) In conjunction with normal patrolling of access routes and training areas, check for hunters and/or vehicles to ensure that they are not within impact areas or closed training areas. Vehicles found outside the cantonment area are to be inspected for Vehicle Control Form. All violations are to be reported to the MP desk sergeant or game warden.

(3) Assist in locating hunters and fishermen in distress or vehicle breakdowns and relay

through their communications network to PMO any specifics to include need for ambulance, wrecker service, or PMO assistance.

(4) Report damaged or missing signs related to impact areas (replace from Range Control inventory as available) off-limits and sector areas, etc., to DPW for appropriate action.

f. Individuals will:

(1) Know and abide by the South Carolina hunting, boating and fishing laws, Federal fish and wildlife regulations, and Fort Jackson regulations governing fishing and hunting on Fort Jackson.

(2) Understand and follow the safety information provided below:

(a) During the period of extreme fire danger, the use of any type of open flame is prohibited while hunting or fishing.

(b) No rifles, pistols, crossbows or shotguns using slugs will be loaded while on the ground when signed out for deer hunting. These weapons may be loaded after the hunter is in an elevated stand and must be unloaded prior to descending.

(c) If Soldiers enter your area for any reason, unload your weapon and immediately return to Heise Pond for possible re-draw. Do not get into an altercation with the soldiers. Training comes first! If an area has to be closed during the hunt FMWR staff, game wardens or Range Control will sound three blasts on their siren or horn, immediately follow the same procedures as if soldiers entered your area.

(d) Use of a safety belt or harness when utilizing any elevated stand, permanent or portable, is highly encouraged.

(3) Comply with the Fort Jackson Hunting Safety Briefing.

4. MANAGEMENT INFORMATION REQUIREMENT. This publication required no MIR.

5. REFERENCES.

a. AR 40-1 (Preventive Medicine; Sanitation, Hygiene).

b. AR 210-10 (Installations; Administration).

c. AR 385-63 (Range Safety).

d. AR 215-1 (The Management and Operation of Army Morale, Welfare and Recreation Programs and Nonappropriated Fund Instrumentalities).

e. AR 200-1 (Environmental and Protection Enhancement).

f. DA PAM 420-7 (Natural Resources; Land, Forest and Wildlife Management).

g. FJ Supplemental 1 to AR 190-11 (Physical Security of Arms, Ammunition, and Explosives).

h. FJ CIR 210-1 (Fort Jackson Installation Hearing Officers).

i. South Carolina Fishing and Hunting Laws and Regulations.

j. FJ Reg 210-2 (Ranges).

k. Post Hunting and Fishing Safety Briefing.

1. 50 CFR 20 Migratory Bird Hunting.

m. Fort Jackson Integrated Natural Resources Management Plan.

(IMSE-JAC-MWR/4-1654)

FOR THE COMMANDER:

OFFICIAL:

JAMES J. LOVE
COL, AR
Garrison Commander

PATRICIA KELLY-JOHNSON
Records Management Division

7 APPENDIXES:

A - General Regulations
B - Fishing
C - Hunting
D - Poaching
E - Suspension and Revocation of Hunting and Fishing Privileges F - Penalties
G- Cantonment Archery
H-Memorandum for Large Game TA Assignment

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APPENDIX A

GENERAL REGULATIONS

1. Safety, security and the sustainability of natural resources are the primary concerns of the Fort Jackson Hunting, and Fishing Program. Therefore fishing, and hunting access is restricted to the following groups of individuals: All active duty personnel, military retirees, DOD APF and NAF personnel, reservists, National Guard, and family members of the above, DOD contractor employees, technical representatives and employees of military banking facilities working on Fort Jackson as determined by the Installation Commander, and the general public to participate In specific hunting and fishing events or programs (ex. hunter camps) as organized by FMWR.

2. Each person (16 years of age and over) who hunts, fishes, or gigs frogs on the Fort Jackson reservation must have in his/her possession a valid Fort Jackson hunting or fishing permit and a Richland County or South Carolina hunting or fishing license. Additionally, persons (16 and older) hunting waterfowl must have a Federal Duck Stamp and a South Carolina Migratory Waterfowl Permit. All migratory bird hunters (16 and older) must also have in their possession, a free Harvest Information Program (HIP) Permit. Turkey tags are required of all turkey hunters regardless of age.

Exceptions:

a. Military personnel on leave who are legal residents of South Carolina and stationed at installations outside of South Carolina are not required to purchase a South Carolina or Richland County hunting or fishing license and a Fort Jackson permit. However, a big game permit for deer and turkey and State and Federal duck stamp along with a HIP permit are required when applicable. Bona fide family members must purchase a resident South Carolina or a Richland County hunting and fishing license and a Fort Jackson guest permit or annual permit. All Active Duty between the ranks of E-1and E-4 can receive FREE Fishing and Hunting Post Permits with a copy of orders.

b. Military personnel on leave who are not legal residents of South Carolina and are stationed at installations outside of South Carolina are required to purchase a nonresident hunting or fishing license and a Fort Jackson fishing or hunting permit. In addition, a nonresident big game permit is required for hunting deer and turkey.

c. Persons 65 years of age or older, or 100 percent service-connected, must have a HIP permit, disabled veterans who are authorized to hunt or fish at Fort Jackson and have obtained a state of South Carolina Gratis or Disability License, will be required to complete a sportsman

locator card each season. In addition, for big game hunting, purchase of big game activity fee is required. For waterfowl, a Federal Duck Stamp must be obtained. South Carolina residents who hold a Lifetime Senior or Lifetime Gratis License are required to have a HIP permit.

NOTE: A youth under 16 years of age may hunt only when accompanied by properly licensed parent or authorized hunter with written permission to sponsor the youth from his/her parent or guardian. Documentation to be furnished at the time of sign out.

3. Post hunting and fishing permits are issued for the period 1 July through 30 June of the following year. Exchanging or lending licenses/permits is prohibited.

4. Guests. Personnel 18 years of age or older who have a valid Fort Jackson hunting or fishing permit are authorized to invite a guest, providing a guest permit is obtained and the sponsor accompanies the guest while hunting or fishing. Rules governing guests are as follows:

a. Guests must have in their possession a valid South Carolina State or Richland County hunting or fishing license. Guests hunting deer or turkey are also required to have a big game permit. Nonresident guests fishing/hunting are required to have a nonresident license and a guest permit.

b. For big game hunting, individuals may bring one guest or two (non-affiliated) family members per day. For small game hunting and fishing, individuals may bring two guests per day.

c. Civilian guests are required to sign a waiver prior to hunting or fishing on the reservation.

d. Guest permits and waiver forms will be signed at Marion Street Station, Bldg 4522, at the time of purchasing the guest permit.

e. Sponsors are responsible for the actions of their guests and to ensure that they abide by all State, Federal, and post hunting and fishing regulations while on Fort Jackson. Sponsors of guests who are cited for violations of these regulations are subject to the same administrative penalties outlined in Appendix E of this regulation as the violator.

f. Guests of big game hunters will be accompanied to and from the hunt area by the sponsor and will be assigned in an area within the same numbered hunt area as the sponsor. Guests fishing and small game hunting will be in the presence of their sponsor at all times while hunting or fishing.

5. Individuals entering authorized hunting, fishing, and scouting areas will sign out and in from the Big Game Check Station (Building number G-2175). Sign out for scouting and fishing will include name, permit number, areas, ponds by number or name (do not sign "all" or "all open" areas) and time out and in. Individuals signing for areas may sign for no more than six alphanumeric areas as noted on the briefing map located at the Big Game Check Station. Areas will be signed for in order of preference and time of use (a.m./p.m.). Possession of weapons while scouting or fishing is prohibited. Individuals fishing should refer to Appendix B for sign out requirements.

6. Individuals hunting, fishing, or scouting will be required to complete **Vehicle Control Forms will be obtained from the Marion Street Station**. Completed vehicle control forms will be placed inside of the windshield so that it may be read from outside the vehicle. The use of any other form or card is not authorized.

7. All hunters regardless of age are required to present their South Carolina Department of Natural Resources Hunter's Education Card or proof of an equivalent program from another state before being issued a Post Small or Large Game Permit. The South Carolina Grandfather clause does not apply to hunting on any Fort Jackson property.

8. Individuals issued an on-post permit will be entered into Rectrac by their social security number. A Privacy Act notice must be provided prior to requesting and entering anyone's social security number. Other information, such as a phone number, obtained will be utilized for emergencies and official action.

9. Special youth hunting days for any seasons (Deer, Waterfowl, Turkey) may be conducted in accordance with State and Federal guidelines concerning dates, times, etc. Family, Morale, Welfare and Recreation and its proponent organizations reserve the right to conduct special youth hunting days.

10. Priority during selection of training areas for hunting large game (deer and turkey) may be given to select groups (primarily active duty soldiers) as afforded by regulation and in accordance with FMWR procedures. Priority designation is subject to change. See Appendix H for details on current priority and procedures.

APPENDIX B

FISHING

GENERAL FISHING REGULATION

1. All fishing on Fort Jackson waters shall be in accordance with the fishing laws of South Carolina. This regulation is designed for use in combination with the South Carolina regulations and anglers should be thoroughly familiar with both. This regulation repeats some South Carolina regulations, but primarily places additional restrictions on fishing Fort Jackson waters.

2. Angler Sign Out/In. Individuals wishing to fish range area waters (Clark, Cobb, Messer's, Odom, Davis, Chaver's, Dupre, South, or Boyden Arbor Ponds, Gills Creek, Colonel's Creek, or any other body of water within the range area of Fort Jackson where training or hunting may be authorized), and all waters within the National Guard licensed area, must check the hunting map at the Big Game Check Station prior to entering the range area. Anglers will sign out only to those range area waters designated as open to fishing on the map using the fishing log book maintained at the Big Game Check Station. No sign-out is required to fish Semmes, Upper and Lower Legion, Arrow Head, Twin Lakes, Golf Course ponds 1, 2 and 3, Catfish Pond, Price's Pond Varn, Heise's Pond, and the east side of Weston Lake. Unless signed out for night fishing, anglers are required to sign in upon completion of fishing or no later than (NLT) 90 minutes after official sunset. Night fishing anglers are required to sign in NLT 90 minutes after official sunrise.

a. **A vehicle control card must be completed and placed inside the windshield of any vehicle entering the range area for the purpose of fishing**.

b. Family members under 16 years of age must be accompanied by a parent or responsible individual (authorized fishing privileges IAW Appendix A) when fishing any Fort Jackson range area waters. An individual must be 18 years of age or older to sponsor a guest. The parent or responsible individual must have a valid state and post fishing permit to accompany or sponsor youth fishing in range area waters.

c. Individuals fishing at Semmes Lake are authorized to fish only the north end starting at Wildcat Creek around to the west side, and up to the dam. Fishing on the Semmes Road dam and the east side of the lake is prohibited.

3. Boats.

a. Boats are prohibited on all golf course ponds (including golf course ponds 1, 2, and 3; Upper and Lower Legion Lakes; and Catfish Pond) and on Semmes Lake. Rowboats, canoes, and other small boats with no artificial power source other than an electric motor are authorized on all other ponds and lakes open for fishing.

b. Outboard motors can be used to fish Davis, Boyden Arbor, Messer's, Dupre, Cobb's, Chaver's, Barstow and Odom Ponds, and Weston Lake. Weston Lake hours of operation are seasonal and may be obtained by calling 751-7353 or 751-LAKE. REMINDER: Weston Lake boaters must observe a no wake, idle speed and use only the authorized boat ramps.

c. All persons occupying a boat on Fort Jackson must wear a Coast Guard Approved Personal flotation Device at all times.

d. All personnel utilizing Outdoor Recreation watercraft at Weston Lake or Marion Street Station shall be aware of safety guidelines for their type of craft.

4. Night Fishing. Night fishing is authorized on Price, Cobb, Davis, Messer’s, Dupre, Clark, Odom, Weston and Semmes’s Lake.

5. Prohibitions. The following is prohibited on Fort Jackson:

a. Releasing any species of fish into a Fort Jackson pond, from either another Fort Jackson pond or from off-post.

b. Individuals baiting or chumming fish in any manner for the purpose of fishing. Taking fish from a pond containing a DPW maintained fish feeder is not prohibited.

c. Taking any species of fish by the use of firearms, seines, or other nets, snares, explosives, electrical apparatus, fish traps or fish baskets (DPW Wildlife Branch personnel are authorized the use of some of these methods for the purpose of gathering management data).

d. Taking bullfrogs with firearms.

e. Night fishing except as specifically noted above.

f. Selling, offering to sell, buying, or offering to buy any fish caught on the installation.

g. Adding or removing boards or tampering with water level control structures in any way.

h. Fishing in any waters posted with "NO FISHING" signs.

i. Taking grass carp. Grass carp are stocked in ponds to help control noxious weeds.

6. Creel Limits. The daily creel limit on all lakes and ponds is:

a. Bass - three per person.

b. Other game fish (as defined in South Carolina Hunting and Freshwater Fishing rules and Regulations) - 15 per person.

c. Catfish - three per person.

d. Non-game fish (except grass carp and catfish) - no limit.

7. Size Limits. There are no size limit restrictions on fish harvested on Fort Jackson.

8. Devices. In lakes and ponds, fish may be caught with hook and line, fly rod, casting rod, pole and line, or hand line only. Set hook, jug fishing, trotlines, bow and arrow, spears, gigs, nets, seines, tires, traps, and other devices are prohibited.

APPENDIX C

HUNTING

SECTION 1: GENERAL HUNTING REGULATIONS

1. Hunters are required to follow both written and oral instruction given by Outdoor Recreation hunt control personnel, and PMO game warden personnel. Hunters are required to attend a hunter safety briefing conducted by Outdoor Recreation. Hunters are also required to cooperate with the DPW Wildlife Branch personnel in the collection of harvest data.

2. Applicable Regulations. In addition to this regulation, all South Carolina Department of Natural Resources (SCDNR) hunting and freshwater fishing rules and regulations and all federal regulations pertaining to hunting and fishing (especially 50 CPR part 20, Migratory Bird Hunting) also apply on Fort Jackson. Where this regulation does not address a specific subject, the applicable state or federal regulation applies. Where this regulation conflicts with state or federal regulations, the more restrictive regulation applies.

3. Hunting Areas. The range area of Fort Jackson is divided into alphanumeric training/hunt areas (hunt areas correspond to recognized military training areas). When the military training schedule allows, these areas are open to hunting. All hunters are required to sign out at the Big Game Check Station prior to entering any hunt areas and sign back in upon completion of hunting or NLT 90 minutes after official sunset (see exception for raccoon and opossum hunting, Sec. 4 of this appendix).

4. No Hunting Areas.

a. Hunting is only authorized in areas designated by DPTMS or FMWR personnel.

b. East Impact Area. Entry into any designated UXO containing impact area for the purposes of hunting, fishing, or scouting is prohibited.

c. No hunting is authorized within 50 meters of the Fort Jackson boundary, except as authorized by special hunts.

5. Other Restricted Areas.

a. Endangered Species Sites. The Endangered Species Act prohibits the "take" of listed fish and wildlife species. "Take" means to "harm, harass, pursue, hunt, shoot, wound, trap, capture, or collect, or attempt to engage in any such conduct. Criminal penalties may apply.

b. Red-Cockaded Woodpecker Sites. Only the following activities are allowed within Red-Cockaded Woodpecker (RCW) sites: Vehicle use on maintained roads and firebreaks and undelayed foot travel through the sites.

c. RCW sites are identifiable by the following means:

(1) Trees at the edge of RCW sites are marked with white diamond shaped signs indicating an endangered species site.

(2) Trees marked with two white bands are RCW cavity trees and shall be avoided.

d. Other endangered species sites are marked with white or yellow, diamond shaped signs with wording indicating an endangered species site. These sites are off limits to all activities including foot travel.

d. Archaeological Sites. Federal law prohibits the disturbance or removal of archaeological artifacts on Fort Jackson (e.g., arrow heads, pottery, fragments, bottles, etc.). In addition, cemeteries are not to be disturbed. Criminal penalties may apply. If artifacts are discovered, leave them in place and report the find to the DPW Cultural Resources Manager at 751-7153

f. Waterfowl Buffer Areas. During Waterfowl season, a 200-yard buffer exists around ponds and streams open to Waterfowl hunting. Deer hunting is prohibited within this buffer during the hours of Waterfowl hunting on days when these areas are open to Waterfowl hunters.

6. Hunting Days. Hunting on Fort Jackson occurs 7 days a week including Thanksgiving. No hunting is allowed on Christmas Day.

7. Shooting Hours. Legal daytime shooting hours are from one hour before sunrise to one hour after sunset. Night is defined as that period of time between one hour after official sunset of a day and one hour before official sunrise of the following day. Night hunting is unlawful except for Raccoons and Opossums. See specific hunting sections in this appendix for variations to legal shooting hours related to specific game and non-game wildlife.

8. Youth Hunting. Youth 16 years of age and younger may hunt only when accompanied by a

properly licensed parent or another authorized hunter with written permission to sponsor the youth from his/her parent or guardian. Individuals 14 to 15 years of age, when deer hunting from a stand, will be assigned to a stand adjacent to the sponsor's. Individuals 13 years of age and younger will sign for the same stand as the sponsor.

9. Scouting. Scouting is authorized except during big game hunting seasons. Individuals wishing to scout must sign out in the scouting log book maintained at the Big Game Check Station before entering any hunt area to scout. Persons scouting may sign out for any six alphanumeric open areas (i.e., lOA, lOB, 13C, 14A, 4B and 7 A). Persons scouting are authorized to sign out 90 minutes before sunrise and must be signed in by 45 minutes after sunset. The possession of any firearm, crossbow, or bow while scouting is prohibited. Scouting may be restricted as necessary to maintain integrity of hunting opportunities; any changes will be posted prior to the restriction.

10. Dog Training/Conditioning. Personnel authorized to hunt on Fort Jackson may condition hunting dogs in small game areas and other open hunt areas on those days when hunting is not authorized. Individuals must sign out and in at the Big Game Check Station. The possession of any firearm or bow while conditioning hunting dogs is prohibited, with the exception of blank starter pistols. Proof of rabies vaccination is required and a completed vehicle control card will be displayed.

11. Weapons/Ammunition.

a. All military full-jacketed ammunition is prohibited from hunting purposes. Hunting with or possession of fully automatic weapons while hunting is prohibited.

b. When transporting a handgun on Fort Jackson for the purpose of hunting, the pistol must be unloaded and carried in a closed container not readily accessible to any vehicle occupant. The handgun cannot be removed until the hunter is parked at his/her assigned hunting area. Carrying a handgun on one's person in a concealed manner is prohibited.

c. See "Authorized Weapons" in the following section for regulations on weapons and ammunition specific to the type of game hunted.

12. Prohibitions. The following is prohibited on Fort Jackson. Exceptions include activities that are used in a recognized, acceptable wildlife management practice by authorized personnel of DPW Wildlife Branch, Fort Jackson PMO, FMWR personnel, and their authorized contractors.

a. Baiting or hunting over a baited area or taking wildlife over a baited area. Baiting is defined

as placing, distributing, exposing, or depositing corn, wheat, or other grain, mineral, or food stuffs to constitute an attraction, lure, or enticement, on, or over any areas where hunters are attempting to take wildlife.

b. Using traps, snares, nets, or other devices to catch wildlife (except as specifically authorized for fishing in Appendix B of this regulation)

c. Moving, tampering with, or altering in any way a trap of any kind or trail camera found while hunting, fishing, or scouting. (The DPW Wildlife Branch sometimes uses these devices for wildlife management activities.)

d. Killing non-game animals (except armadillos, hogs and coyotes).

e. Taking any wildlife out of season.

f. Hunting at night (except authorized raccoon and opossum hunting, see SECTION 4, Subsection 4 of this Appendix).

g. The use of artificial lights to observe or harass wildlife in any manner (except vehicle headlights while traveling in a normal manner on public roads). Artificial lights may be used to take raccoon and opossum after being treed or cornered by dogs (see SECTION 4, Subsection 4 of this Appendix).

h. Selling, offering to sell, buying, or offering to buy any wildlife taken on post.

i. Entering the East Impact Area at any time.

j. Entering Fort Jackson with the intent to retrieve wildlife without prior notification and consent of the PMO.

k. Hunting from a motorized vehicle or horseback (special exceptions for handicapped persons will be made by FMWR personnel in coordination with PMO on a case-by-case basis). Anyone utilizing a bicycle as transportation must have their weapon in a case and unloaded.

l. Transporting loaded weapons within a vehicle.

m. Allowing dogs to run except as authorized in this regulation.

n. Using strips of fluorescent orange in lieu of a fluorescent orange hat, coat, or vest.

o. Interfering with troop training or operations or other personnel in the performance of their official duties.

p. Bypassing gates or barriers with vehicles.

q. Drinking alcoholic beverages while hunting or hunting while under the influence of alcohol, drugs, or possessing alcoholic beverages are prohibited while in the hunting area.

r. Use of a loaded rifle, pistol, crossbow, or shotgun with slugs on the ground while deer hunting.

s. Adding or removing boards or otherwise tampering with any water control structure.

t. Opening or otherwise tampering with artificial nest boxes (wood duck, blue bird, etc.).

u. Taking any game or non-game animals not specifically authorized in this regulation.

v. Parking off-post while hunting or fishing on Fort Jackson or being picked up by another vehicle off-post while signed out for hunting on-post.

w. Pursuing wounded game after legal hunting hours without first signing in at the Big Game Check Station. Game warden personnel will accompany hunters pursuing wounded game after hours as resources permit.

x. Not signing out or in at the Big Game Check Station when required and/or not having a vehicle control card displayed on the dash of a vehicle.

y. Cutting or removing any pine trees (except for limited cutting of limbs near deer stands).

z. Driving on designated closed firebreaks with POVs.

SECTION 2: WHITE-TAILED DEER HUNTING

1. Season Dates.

a. Legal Bucks - 15 August through 01 January. Legal bucks are defined as deer with visible antlers at least two inches above the hairline as specified by South Carolina law. Legal bucks within the Quality Deer Management Area are defined as bucks having a minimum of four antler points (one inch or longer) on one side of antlers, or 12-inch minimum inside antler spread.

b. Antlerless Deer - 15 September through 01 January for all authorized weapons.

c. Cantonment Bow Areas - 15 September through 01 January.

d. Note: The opening and closing dates may vary by one day from year-to-year as defined by state regulations.

2. Bag Limits.

a. The season bag limit for white-tailed deer on Fort Jackson is one legal buck, one either sex (hunter's choice of a legal buck or antlerless deer), and three antlerless deer. Bow hunters are authorized two additional deer (one doe and one either sex) when hunting in cantonment bow areas. Bag limits apply to the Quality Deer Management Area, except that Legal bucks must have a minimum of four antler points (one inch or longer) on one side of antlers, or 12-inch minimum inside antler spread.

b. The daily bag limit is one legal buck and two antlerless deer.

3. Hunting Hours. Legal hunting time for deer is the time between one hour before official sunrise until one hour after sunset.

4. Antlerless Deer. When an antlerless deer is harvested, individuals must transport the deer to the Big Game Check Station by the most direct on-post route, at which time a state antlerless deer tag will be issued and affixed to a hamstring. Transportation off post without a bona fide tag is in violation of state regulations.

5. Authorized Weapons. No weapons other than those specifically authorized for use on the ground may be loaded until in an elevated position (for purposes of this regulation, an elevated position means a stand at least ten feet above the ground level).

a. Rifles. Centerfire rifles are authorized for deer hunting, but may only be loaded and used while in an elevated stand. No loaded rifles are allowed on the ground. Rimfire weapons are not authorized for deer hunting. Minimum caliber authorized as per South Carolina Hunting Regulations.

b. Shotguns. Shotguns, 20 gauge and larger utilizing buck shot, are authorized for deer hunting on the ground or in an elevated position. Slug ammunition may only be used from an elevated stand.

c. Handguns. Only centerfire pistols with at least 5 inches of barrel length are authorized for

deer hunting, but only from an elevated position. Minimum caliber authorized as per South Carolina Hunting Regulations.

d. Bow and Arrow. Bow hunting for deer is authorized in all hunt areas. Hunters utilizing bow and arrow in any rifle area must wear the requisite hunter orange garments as specified in this regulation for other ground hunting during deer season and follow all applicable rules. Special "Bow Areas" (BA) are also designated for archery deer hunting only. Areas designated as "Cantonment Bow Areas" (See Appendix G) may only be hunted from elevated stands, the others may be hunted from the ground. Use or possession of crossbows (see exception below) or poison arrows is prohibited. Possession of firearms in bow areas is prohibited, except for authorized small game hunting, and organized group hunts conducted by the Outdoor Recreation staff.

e. Crossbows. Fort Jackson FMWR classifies crossbows on a par with centerfire rifles and handguns, and allows their use under similar restrictions. Crossbows are authorized for deer hunting, but may only be loaded while in an elevated stand. No loaded crossbows are allowed on the ground. Minimum crossbow specifications authorized as per South Carolina Hunting Regulations. Crossbows are prohibited in all cantonment bow areas. (See appendix G for Bow Areas designated as cantonment bow areas.) Crossbow hunting in non-cantonment bow area is restricted to elevated hunting. Hunter orange is required.

f. Black powder rifles are authorized for deer hunting, but only from an elevated position. The weapon must have primer removed prior to descending from the stand. Minimum caliber authorized as per South Carolina Hunting Regulations.

6. Game Check In. All deer taken on Fort Jackson must be brought to the Heise Pond Big Game Check Station. Deer may be cleaned (field-dressed) in the field during August and September. Deer may not be field-dressed during the remainder of the season. Hunters wishing to transport harvested antlered deer to the Big Game Check Station utilizing Leesburg road must call the MP station prior to exiting McCrady Training Site gate.

7. Miscellaneous.

a. Removing deer which are accidentally or illegally killed or found dead is prohibited.

b. Hunters finding such carcasses must report them to the Military Police (phone 751-3113/3114).

c. All personnel (civilian and military) searching on Fort Jackson for lost or wounded game from off post will report to the Fort Jackson Military Police Desk (Bldg 9514) and obtain

approval prior to searching. PMO will be notified immediately when someone has made a request to search for dogs or wounded game. PMO personnel will ensure area requested to be searched is cleared with Outdoor Recreation and then will escort the hunter(s) into the area as resources permit; otherwise, hunter(s) may be allowed a reasonable time to conduct their search and return to the Military Police Desk.

Subsection 1. Still Hunting.

1. Hunter Sign out. Sign out will be accomplished by a drawing at 1215 hours on the day prior to the hunt, Outdoor Recreation personnel or the most senior individual on site may conduct drawings. For deer hunting, a hunter may only sign for one stand or alphanumeric stalk area at a time.

a. After the drawing and after the hunter sign out/in sheet has been printed, on the day prior and up through close out on the day of hunting, any authorized hunter may sign for any open area.

b. Sign out for same day hunting will cease NLT one hour before official sunset.

c. Certain areas have been designated for big game hunting with bow and arrow only. These areas are labeled bow areas. No weapons other than bow and arrow (and crossbows outside of the cantonment Bow Areas) are authorized in these areas for big game hunting except during organized group hunts conducted by FMWR personnel and
authorized small game hunting.

d. With the approval of the Chief, Community Recreation Division, and the Manager, Outdoor Recreation Branch, FMWR personnel may modify these sign-out procedures as necessary to improve the process or to resolve conflicts.

2. Hunter Safety.

a. All deer hunters must wear a visible, solid, hunter orange coat or vest and headgear while hunting (with the exception of bow hunters hunting in a bow area, unless hunting on the ground in applicable bow areas). The use of red or faded fluorescent orange apparel, which has lost the color for the intended safety purpose, is prohibited. Once in an elevated stand, a hunter may remove either hat or vest/coat but not both.

b. Deer stands found to be in need of repair will be closed until repairs have been completed. Hunters will not use damaged deer stands in need of repair. Hunters should report damaged deer stands to FMWR.

c. Except when entering or leaving, those hunters signed out for a permanent stand are restricted to an area within a 100 meter radius of the stand (closed areas are not to be entered). Vehicles will be parked within the hunter's assigned area and located so as not to disrupt another hunter or official training.

d. When signed out to an alphanumeric hunt area, hunters are not authorized to hunt or park within 200 meters of a permanent deer stand. Only one hunter will be allowed to sign out to each alphanumeric hunt area, except when a hunter is accompanying another hunter under the age of 16 years, or the first hunter signing for an alphanumeric area agrees to authorize additional hunters (not to exceed quotas set by FMWR, normally four hunters) within the area. Multiple hunters may sign out for designated Bow Areas when these areas are open to hunting. The number of hunters allowed in each Bow Area is restricted to the number of spaces available on daily sign out sheets. During waterfowl seasons, a 200 yard buffer around ponds and streams open to waterfowl hunting exists. Deer Hunting is prohibited within this buffer during the hours of Waterfowl hunting on days when these areas are open to Waterfowl hunters. Information regarding waterfowl hunting seasons during the deer season and open areas will be available at the Big Game Check Station.

e. No hunting within 50 meters of a hard surface road, except in a permanent numbered deer stand.

f. Deer hunting is prohibited within 300 yards of a residence without permission of the owner and occupant.

Subsection 2. Dog Drives. General. Dog drives are considered special hunts, and must be proposed by the DPW Wildlife Branch, and approved by the Garrison Commander. Once approved, a memorandum must be provided to the PMO for coordination and support. FMWR personnel will assist with drives as required. Each vehicle must have a vehicle control card displayed on the dash.

SECTION 3: TURKEY HUNTING

1. Season Dates. The season for turkey hunting on Fort Jackson will be the same as those listed in the annual brochure on spring turkey hunting published by South Carolina Department of Natural Resources (SCDNR). Only spring season hunting is authorized on Fort Jackson.

2. Bag Limits. The bag limit for eastern wild turkeys on Fort Jackson is one bird per day, two birds per season; gobblers only. All turkeys taken on Fort Jackson, count as part of the hunter's

state-wide bag limit. All turkeys taken on Fort Jackson must be tagged with a SCDNR turkey tag prior to moving the bird from the point of kill.

3. Shooting Hours. It is unlawful to shoot any Turkey between 30 minutes after official sunset and 30 minutes before official sunrise.

4. Authorized weapons. Turkeys may be taken with bow and arrow, not crossbow, or shotguns only (rifles, crossbows, and handguns are prohibited). The use of buck shot, and possession of it while in the field during turkey season, is prohibited. If open, turkey hunting in Bow Areas is authorized with bow and arrow only (possession of firearms in these areas is prohibited). Cantonment Bow Areas are closed to turkey hunting.

5. Game Check In. All turkey taken on Fort Jackson must be brought to the Big Game Check Station for check in. Hunters must weigh, measure, and record the harvest information.

6. Hunter Sign Out/In. Hunters must sign out from the Big Game Check Station prior to turkey hunting on Fort Jackson and sign in NLT 90 minutes after official sunset. Sign out will be allowed by numbered turkey hunt area only. These areas are shown on the turkey hunt map issued to hunters when purchasing a post hunting permit. The number of hunters and/or callers (no weapons) authorized to hunt in each area will be in accordance with administrative procedures established by FMWR personnel. DPW may establish harvest limits for each numbered area, once the number of turkeys allowed are harvested the area will be closed to further hunting for the remainder of the season.

7. Prohibitions. The following activities are prohibited while turkey hunting on Fort Jackson:

a. Using electronic calls, recorded calls or sounds, or electronically amplified imitations of calls or sounds.

b. Baiting and/or hunting near bait (any baited areas found will be closed immediately).

c. Using dogs for turkey hunting.

d. Shooting turkeys from vehicles.

SECTION 4: SMALL GAME HUNTING

1. Small Game. Small game includes the following species: quail, squirrel, rabbit, raccoon, opossum, fox, and beaver.

2. Hunting Sign Out/In.

a. Each vehicle must have a vehicle control card displayed on the dash.

b. Small game hunters are required to sign out and in at the Big Game Check Station prior to hunting on Fort Jackson. Each hunter must enter his/her name, post hunting permit number, sign out time, and the specific alphanumeric areas to be hunted (maximum of six). Hunters must return to the Big Game Check Station after hunting is completed or NLT 90 minutes after official sunset and enter their sign in time and harvest data. (Exceptions are granted for raccoon and opossum hunting; see Section C, Subsection 4, para 4.)

3. Authorized Weapons. Only shotguns, .177 caliber rimfire and .22 caliber rimfire handguns or rifles (for squirrel, raccoon, and opossum hunting) and bow and arrow. Crossbows are prohibited. Possessing rifled slugs, buckshot, or other shot larger in diameter than No.4 shot (except the appropriate Nontoxic shot when hunting waterfowl) while small game hunting, is also prohibited.

4. Bag Limits. The bag limits and other restrictions listed in this section either corresponded to, or were more restrictive than State and Federal regulations at the time of writing. If State and/or Federal regulations change, the more restrictive of State, Federal, or Fort Jackson regulations apply.

Subsection 1. Migratory Game Birds (Mourning Dove, Waterfowl, Crows, American woodcock, Common Snipe).

1. Specific regulations, the season dates and bag limits for mourning dove, waterfowl, crows, snipe and woodcock on Fort Jackson will be the same as Federal and South Carolina regulations (see the South Carolina Migratory Bird Hunting Regulations brochure). Shotguns only are authorized for taking these migratory game birds. The shotgun cannot be capable of holding more than three shells, unless it is plugged with a one-piece filler which cannot be removed without disassembling the gun. REMINDER: When hunting for migratory birds, a HIP Permit must be obtained by any hunter 16 years of age or older.

a. Dove Hunting.

(1) Shooting Hours will be determined by Federal and State Migratory Bird Regulation and FMWR/DPW personnel prior to the season.

(2) To prevent overcrowding of dove fields, the number of hunters allowed in any one field may be restricted. Hunters will be notified of any restrictions prior to dove season.

(3) There is a 50 shell limit per hunter.

b. Waterfowl Hunting.

(1) Shooting Hours. Shooting hours are one-half hour before official sunrise until 1200. Shooting hours for resident Canada Geese during the early and late Canada Goose season (typically during September and February) are one-half hour before official sunrise to official sunset. During the early Canada Goose season, only Canada Geese may be harvested before official sunrise or after 1200 (i.e., no teal). Shooting hours for the early teal season (typically held in September; dates can be found in SCDNR Migratory Bird Regs) on Fort Jackson will be from official sunrise until 1200.

(2) There is a 25 shell limit per person. The possession of lead or other toxic shot while waterfowl hunting is prohibited. When signed out for waterfowl hunting, no other game may be harvested, except that hunters may take any beaver that travel within range of their waterfowl hunting location, but only with weapons and ammunition approved for waterfowl hunting.

(3) Waterfowl Management Areas. During the waterfowl season, the areas/ponds listed below will be open to waterfowl hunting during the authorized shooting hours as determined by FMWR and the DPW Wildlife Branch and on opening day, and closing day, provided that a training area adjacent to the area is open to small or large game hunting. The areas and a 200 meter buffer zone around them are off limits to all hunters except authorized waterfowl hunters, during the time of authorized waterfowl hunting on the days designated for water fowl hunting. Some of these areas are located along the boundary of two or more training areas. If all of the training areas surrounding the waterfowl area have not been opened for hunting, waterfowl hunting is only authorized within 50 yards of the areas edge that is adjacent to the open training area. Hunters may only sign for two areas at a time for waterfowl hunting. The ponds and areas included under this subsection are:

(a) Creeks and streams, i.e., Gills, Mack, Rowell, Bynum, Rose, Cedar, Buffalo, and Colonels Creek will be opened on a rotational basis.

(b) Ponds and tributaries will also be opened on a rotational basis.

(c) No waterfowl hunting is authorized in, on or around any waterway, or water source without the area being opened for waterfowl hunting.

(d) Shooting at or tampering with wood duck nest boxes is prohibited.

(e) To prevent overcrowding of waterfowl hunting areas, the number of hunters allowed

in any one pond or stream may be restricted. Hunters will be notified of any restrictions prior to waterfowl season.

Subsection 2. Quail Hunting.

1. Season Dates. Season dates for quail on Fort Jackson will correspond with South Carolina regulations. These dates are normally Thanksgiving Day through 1 March.

2. Bag Limits. The daily bag limit for bobwhite quail on Fort Jackson is six birds.

3. Authorized Weapons. Shotguns are the only authorized weapons for quail hunting.

Subsection 3. Rabbit Hunting.

1. Season Dates. Season dates for rabbit on Fort Jackson will correspond with South Carolina regulation. These dates are normally 28 November through 1 March (Guns and Dogs).

2. Bag Limits. The daily bag limit for rabbit on Fort Jackson is five.

Subsection 4. Raccoon and Opossum Hunting.

1. Season Dates. Season dates for raccoon and opossum on Fort Jackson will correspond with South Carolina regulation. These dates are normally:

a. Guns and Dogs - 15 September through 15 March.

b. No Guns - 15 August through 14 September and 16 March through 14 May.

2. Bag Limits. The daily bag limit for raccoons and opossums is two per party per night.

3. Authorized Weapons. Only shotguns, .177 caliber rimfire and .22 caliber rimfire handguns or rifles are authorized during the "guns and dogs" season. During the "no gun" seasons, raccoon and opossum can be hunted with dogs only. Possession of (either on one's person or in one's vehicle) any firearm, saw, artificial call, or tree climbing device is prohibited.

4. Raccoon and Opossum hunting is authorized at night in those areas designated by FMWR personnel on the hunting map at the Big Game Check Station. These animals may not be hunted with artificial lights except when treed or cornered with dogs as per South Carolina law.

5. No more than five people in each group of which only two can be guests. Guests must

purchase a daily or seasonal guest permit.

Subsection 5. Squirrel Hunting.

1. Season Dates. Season dates for squirrel on Fort Jackson will correspond with South Carolina regulation. These dates are normally 1 October through 1 March (guns and dogs).

2. Bag Limits. The daily bag limit for Gray Squirrels on Fort Jackson is ten; only one Fox Squirrel is allowed to be harvested during the entire season.

3. Authorized Weapons. (Crossbow are prohibited) Only shotguns, .177 caliber rimfire and .22 caliber rimfire handguns or rifles and bow and arrows may be used.

SECTION 5: HOG, ARMADILLO, AND COYOTE HUNTING.

1. Season Dates. There is no closed season on hunting hogs, armadillos and coyotes, but there are certain restrictions related to hunting these animals during hunting seasons for game animals. (SEE BELOW)

2. Bag Limits. There are no limits on the number of hogs, armadillos, or coyotes that can be harvested on Fort Jackson.

3. Authorized weapons. During deer, turkey, and small game season, hogs, armadillos, and coyote can only be hunted with weapons authorized for use during these seasons for game animals. Periods when game animal seasons are closed (typically 02 May – 14 August), hogs, armadillos, and coyotes may be hunted with the following weapons.

    a. From an elevated shooting position: Bow and arrows, crossbows, centerfire and rimfire rifles, shotguns utilizing #4 and larger buck shot and slugs, and handguns.

    b. From a ground position: Bow and arrows, (not crossbows), shotguns utilizing #4 and larger buck shot only (no slugs), and rimfire rifles only.

4. The following apply to hunting Hogs, Armadillo, and Coyotes:

    a. A State hunting license and a Fort Jackson hunting Permit (large or small game permit), are required.

    b. The same sign-out/sign-in procedures required for small game hunting are to be followed.

c. Animals harvested must be recorded on date sheets located at the Big Game Station.

d. Electronic calls are authorized.

e. Night hunting is prohibited.

f. The use of dogs is prohibited.

g. Only one hunter (or group of hunters hunting together and within sight of each other at all times) is authorized in any one particular hunt area.

h. Bow hunters are authorized to hunt coyote, armadillo and hogs within designated bow areas utilizing archery equipment only- no firearms allowed. Cantonment Bow Area are open for coyote, armadillo, and hog hunting utilizing bow and arrows only, no crossbows. All hunting within Cantonment Bow Areas must be from an elevated position; hunting from the ground is prohibited.

i. Hunter orange clothing is required for coyote, armadillo and hog hunting during deer season.

APPENDIX D

POACHING

1. Poaching is defined as illegal taking of game by any means from the Fort Jackson military reservation. These illegal activities detract from the recreational welfare and natural resources of Fort Jackson.

2. The DES is responsible for enforcing the laws and regulations pertaining to Fort Jackson's wildlife areas. All hunters are responsible for reporting acts of poaching or suspicious activities and to assist in the protection of wildlife. Individuals who provide information on poaching activities will remain anonymous.

3 Several law enforcement techniques will be used to deter poaching on Fort Jackson. These techniques include, but are not limited to:

a. PMO patrols of wildlife areas.

b. The use of checkpoints outside the cantonment area.

c. Enforcement of off-limits hunting areas.

d. Targeting poachers through special operations and the use of aerial surveillance.

e. Depending upon the availability of other resources, different techniques may be used at the discretion of the PMO.

4. Anyone found in the hunting areas without approval will be considered as a trespasser, and all equipment (weapons, traps, vehicles, etc.) found in the individual's possession will be impounded by Fort Jackson PMO personnel. Additionally, personnel found poaching/trespassing will be subject to issuance of a DD Form 1408/1805 citation or cited on a DA Form 3975 Military Police Report for administrative, non-judicial and/or criminal charges in federal court. Personnel reporting violations should contact the Military Police Desk at 751-3113/3114 or 911.

APPENDIX E

SUSPENSION AND REVOCATION OF HUNTING AND FISHING PRIVILEGES

1. The Provost Marshal may suspend hunting and fishing privileges. A suspension will become final unless appealed within ten days. The Provost Marshal will inform the suspended individual of his appeal rights to the Installation Hearing Officer.

2. The Provost Marshal will furnish suspension notices and accompanying information to the Installation Hearing Officer. The Hearing Officer will take action on appeals in accordance with FJ Reg 210-2.

APPENDIX F

RECOMMENDED PENALTIES

SECTION 1: HUNTING

OFFENSE	1st CITATION	2d CITATION
Firing a weapon indiscriminately, endangering personal life.	Withdraw privileges permanently	
Permitting another to use hunting license or permit.	Withdraw privileges up to two years	Withdraw privileges permanently
Killing, transporting, or possessing game taken illegally	Withdraw privileges up to five years	Withdraw privileges permanently
Unauthorized hunting at night.	Withdraw privileges up to five years	Withdraw privileges permanently
Hunting out of season.	Withdraw privileges up To two years	Withdraw privileges up to ten years
Shooting from vehicle.	Withdraw privileges permanently	
Unauthorized use, carrying or transportation of weapons.	Withdraw privileges up To one year	Withdraw privileges up to three years
Taking of game from baited area.	Withdraw privileges up to one year	Withdraw privileges up to five years
Unauthorized use of dogs.	Withdraw privileges up to two years	Withdraw privileges up to five years
Hunting without required licenses or Fort Jackson permit in possession.	Withdraw privileges up to five years	Withdraw privileges permanently

Endangering personal life.	Withdraw privileges up to five years	Withdraw privileges permanently
Transportation of loaded weapons in vehicle.	Withdraw privileges up to one year	Withdraw privileges up to three years
Hunting or scouting in a closed or unassigned area.	Withdraw privileges up to one year	Withdraw privileges up to three years
Other violations of state, Federal, or installation regulations not covered in this regulation.	Withdraw privileges up to 90 days	Withdraw privileges up to 120 days
Failure to sign out or in before or after hunting.	Withdraw privileges up to three months	Withdraw privileges up to one year
Taking and/or possession of more than the authorized bag limit for any species.	Withdraw privileges up to five years	Withdraw privileges permanently
Use of hunting dogs without dated or valid rabies vaccination.	Withdraw privileges up to 180 days	Withdraw privileges up to two years
Selling, offering to sell, or buying game from the reservation.	Withdraw privileges permanently	
Use of alcoholic beverage or under influence of alcohol or drugs while hunting.	Withdraw privileges up to two years	Withdraw privileges up permanently
Hunting from horseback.	Withdraw privileges up to 180 days	Withdraw privileges up to two years
Possession of buckshot or slugs while small game hunting.	Withdraw privileges up to 180 days	Withdraw privileges up up to two years
Use of traps, snares, nets, or any other devices to catch game.	Withdraw privileges up to two years	Withdraw privileges up up to five years

Failure to check in deer or turkey taken on Fort Jackson for biological data collection.	Withdraw privileges up to three years	Withdraw privileges permanently
Taking any game animal not specifically authorized in this regulation.	Withdraw privileges up to two years	Withdraw privileges up to three years
Taking non-game animals.	Withdraw privileges permanently	
Failure to display vehicle control card.	Withdraw privileges up to 30 days	Withdraw privileges up to 180 days
Hunting in a non-hunt area, i.e., East Impact Area or Housing area.	Withdraw privileges up to three years	Withdraw privileges permanently
Failure to update Sportsman locator card with current information, i.e., address & telephone number.	Withdraw privileges up to three months	Withdraw privileges up to one year
Taking an antlered deer from the Quality Deer Management Area that does not meet the antler Restriction.	Withdraw privileges up to one year	Withdraw privileges up to two year

SECTION 2: FISHING:

OFFENSE	1st CITATION	2d CITATION
Permitting another to use fishing license or Fort Jackson permit.	Withdraw privileges up to two years	Withdraw privileges permanently
Fishing in closed lakes or ponds.	Withdraw privileges up to one year	Withdraw privileges up to two years
Fishing by unauthorized methods.	Withdraw privileges up to one year	Withdraw privileges up to three years
Fishing with more than two lines from shore.	Withdraw privileges up to 30 days	Withdraw privileges up to 180 days
Unauthorized use of combustion motors.	Withdraw privileges up to 30 days	Withdraw privileges up to one year
Fishing without required license or Fort Jackson permit in possession.	Withdraw privileges up to 30 days	Withdraw privileges up to one year
Failure to sign out or in before or after fishing.	Withdraw privileges up to 30 days	Withdraw privileges up to 180 days
Unauthorized night fishing.	Withdraw privileges up to one year	Withdraw privileges up to two years
Possession of fish below the authorized size limit.	Withdraw privileges up to one year per each unauthorized fish	Withdraw privileges permanently
Possession of more fish than the legal limit.	Withdraw privileges up To five years.	Withdraw privileges permanently
Trespassing, illegal entry or bypassing locked gates	Withdraw privileges up to two years	Issuance of DD Form 1805

Releasing fish, except when returning fish caught under the authorized size limit to Fort Jackson waters. Page B-2, para 5a	Withdraw privileges up to two years	Withdraw privileges up to five years
Baiting or chumming fish for fishing purposes.	Withdraw privileges up to one year	Withdraw privileges up to three years
Tampering with water control structures.	Withdraw privileges up to one year	Withdraw privileges up to three years

SECTION 3: BOATING:

OFFENSE	1st CITATION	2d CITATION
Failure to wear personal flotation Device (lifejacket)	Withdraw privileges up to 180 days	Withdraw privileges permanently
Failure to operate vessel in safe manner or endangering others.	Withdraw privileges up to 1 year	Withdraw privileges Permanently
Operation of boat while under the influence of drugs or alcohol.	Withdraw privileges up to 2 years	Withdraw privileges Permanently

NOTE: The administrative penalties contained in the Appendix do not preclude the imposition of fines/forfeitures or other judicial penalties in addition to these administrative actions. Withdrawal privileges may be imposed to cover exclusion from one season to the next. Criminal charges may be brought, in addition to any denial of privileges or exclusion from the installation.

APPENDIX G

CANTONMENT ARCHERY

SECTION 1: GENERAL HUNTING REGULATIONS

1. All bow hunters accessing areas of Fort Jackson designated as bow areas must familiarize themselves with these instructions, and demonstrate ethical bow hunting practices at all times.

2. In an effort to decrease the density of deer in the cantonment area, certain areas have been opened for archery-only hunting. These areas are in close proximity to buildings and facilities (administration, training, recreation, etc.), walking trails, and private property. Considerable caution will be exercised at all times while hunting these areas. Be aware of, and considerate of, other people within and adjacent to these bow areas.

3. Bow areas 1, 2, 5, 6, 7, 8, 9, 10, 11, and 13 are considered "cantonment bow areas". Hunters are allowed two additional deer (one doe and one either sex) to be taken from these areas. Hunters are encouraged to harvest does from these areas to assist with reducing the cantonment area deer density.

4. Season Dates: Deer hunting in the cantonment bow areas will not take place prior to the opening day of either sex deer hunting, usually 15 September.

5. Bow areas 3, 4, WLR2 and WLR3 are not "cantonment bow areas" but are still bow only hunting. Ground hunting is allowed, hunter orange restrictions apply.

6. In order to provide safe and effective hunting, these instructions are to be followed at all times. If ever in question, do not hunt! Specific bow area maps are available and shall be referenced.

7. The following rules apply to bow hunting in cantonment bow areas.

a. Elevated hunting only in cantonment bow areas. No stalking or ground hunting.

b. No field dressing deer. All deer harvested must be taken to the Big Game Check Station for cleaning.

c. No hunting within 50 meters of a bow area boundary, building, facility, or walking trail.

d. No hunting within 100 meters of the installation boundary in Bow Area 9.

e. Deer hunting is prohibited within 300 yards of a residence.

f. Only White-tailed Deer, hogs, coyotes, and armadillo are to be shot at while deer hunting in cantonment bow areas.

g. Do not pursue wounded deer beyond the bow area boundaries, especially onto private property. Contact the Law Enforcement Activity Game Wardens for assistance.

h. All efforts are to be made to recover wounded deer.

i. If military personnel enter the area, hunters are to leave the area without disrupting military activities.

j. Become familiar with the bow area boundaries. If in question, do not hunt.

k. Be conscientious of the non-hunting public. Do not display harvested deer while being transported from the area. Deer are to be transported out of public view and those transported on cargo racks are to be covered.

l. Possession and use of crossbows in a cantonment bow area is prohibited. Crossbow hunting in non-cantonment bow area is restricted to elevated hunting. Hunter orange is required.

APPENDIX H

IMSE-JAC-MWR 26 March 2009

MEMORANDUM FOR RECORD

SUBJECT: Large Game Training Area Assignment Hunt Draw – Standard Operating Procedures (SOP)

1. Purpose and Scope. This Standard Operating Procedure (SOP) establishes policies and procedures for Training Area Assignment (Draw Procedures) associated with large game hunting (turkey and deer) on Fort Jackson.

2. Applicability. Policies and procedures outlined herein are applicable to all individuals associated with or authorized to engage in large game hunting on Fort Jackson.

3. Eligibility. Eligibility for participation in large game hunting is restricted to that prescribed by AR 215-1, reference 6a, and limited to those individuals meeting the requirements set forth in FJ 28-4, Fort Jackson Hunting and Fishing Regulation (South Carolina Licenses, Fort Jackson Permits, and Hunter's Education Training).

4. Procedures:

a. Due to the operational tempo experienced by the majority of active duty personnel associated with training at Fort Jackson, the intention of these procedures is to provide a mechanism whereby they receive fair and reasonable access to prime hunting areas on the installation during the large game seasons.

b. Active Duty Soldier Procedures. Active duty Soldiers may register for hunting areas not less than two days in advance of any chosen hunt day for the training area of their choice at Marion Street Station during normal business hours, either by phone at 803-751-3484, or in person, with the following exceptions:

(1) Saturdays - Due to the process by which information for weekly training area closures is relayed to FMWR, soldiers will be allowed to sign out at 1200 hours or at the earliest time thereafter that closure sheets are received from DPTMS on the Thursday prior.

(2) Active duty priority given for hunts on Wednesdays and Thursdays must occur on

Mondays for both days as Marion Street Station is closed on Tuesdays. Normal business hours for Marion Street Station are as follows.

Monday - 0700-1300
Tuesday – Closed
Wednesday through Sunday - 1000-1800

(3) Priority will not be extended to active duty hunters on the day prior to hunts. They may participate in the non-active duty hunter drawings on that day or sign-in after the drawing.

(4) It is the responsibility of active duty hunters to know what training areas are open to hunting. Hunting closure sheets are maintained at the Big Game Processing Station and Marion Street Station for viewing. FMWR personnel should not be overly distracted from their normal course of duties to aid in the completion of registrations.

(5) If more than one active duty hunter is physically present at the opening of Marion Street Station on any given day, a simple random procedure to decide priority will be utilized, if necessary (flip a coin or random number draw).

c. Non-Active Duty Hunter Procedures.

(1) One day prior to hunting, all hunters may participate in a random number draw to determine assignments for available training areas.

(2) Hunters participating in the drawing will line up and are counted.

(3) Numbered tags, equal to the number of hunters present, are placed in the drawing cup. (If there are 16 hunters, tags 1-16 should be placed in the cup.)

(4) Hunters draw tags individually to receive priority for training area assignment.

(5) The hunters drawing the first and last numbered tags will participate in a coin toss. The winner of the coin toss, shall be the first hunter to choose their available training area with the exception of active duty hunters that may have signed up earlier per the procedures above.

(6) Tags are collected as individual hunters sign into their chosen available training area.

(7) Tags may not be traded.

d. Cooperative efforts to attain priority access to training areas are against the spirit of this procedure and should not be utilized. Anyone who violates this policy may be restricted from future drawings and restricted to signing out for available training areas after the drawing has taken place.

e. Drawing is held promptly at 1215 at the Big Game Check Station at Heise's Pond.

f. All participants are afforded equal access to draw procedures and shall not be discriminated against by status, rank, age, or other defining characteristic.

g. Drawings should be held by FMWR personnel. If FMWR personnel are not present at 1215, the draw may be conducted by those hunters present following the procedures outlined above.

5. Any complaints concerning drawings or drawing procedures should be directed to the Outdoor Recreation Program Manager at 803.751.3487.

Signed Copy on File
Mark Smyers
Outdoor Recreation
Program Manager

APPENDIX 10

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APPENDIX 11

ANNUAL WORK PLANS

Year	Activity	POC	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
			Planned	Complete	Planned	Complete	Planned	Complete	Planned	Complete
FY2017	Maintain signs around smooth coneflower site	Wildlife	X							
	Harvest achenes from smooth coneflower	Wildlife	X							
	Maintain seedbeds and sow smooth coneflower achenes	Wildlife	X							
	Monitor smooth coneflower for training related damage	Wildlife	X		X		X		X	
	Prepare Flora Annual Report to USFWS	Wildlife	X							
	Assess anti-erosion measures on endangered plants	Wildlife			X					
	Clear woody vegetation from smooth coneflower site	Wildlife			X					
	Repair fencing and excluders at smooth coneflower site	Wildlife			X					
	Prescribed burn the smooth coneflower site	Forestry/ Wildlife			X					
	Prescribed burn the rough-leaved loosestrife site	Forestry/ Wildlife			X					
	Monitor rough-leaved loosestrife	Wildlife					X			
	Monitor smooth coneflower	Wildlife					X			
	Conduct RCW Monitoring	Wildlife	X		X		X		X	
	RCW Annual Cavity Tree Inspections	Wildlife	X							

Year	Activity	POC	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
			Planned	Complete	Planned	Complete	Planned	Complete	Planned	Complete
	Identify and map areas in need of midstory control	Wildlife	X		X		X			
	Prepare contract SOW for midstory control	Wildlife	X							
	Implement midstory contract	Wildlife	X		X					
	Perform in-house chemical mechanical midstory treatments	Wildlife/ Forestry							X	
	Implement prescribed fire plan for RCW	Forestry/ Wildlife	X		X		X			
	Conduct post-burn evaluations for RCW habitat	Forestry/ Wildlife	X		X		X			
	Implement silvicultural prescriptions for endangered species habitat	Forestry/ Wildlife	X		X					
	Inspect timber harvests for RCW compliance	Wildlife	X		X					
	Conduct forest inventory for endangered species management	Forestry/ Wildlife							X	
	Native Groundcover Restoration-Planting	Wildlife			X					
	Native Groundcover Restoration-Monitoring	Wildlife					X		X	
	Replace/install new RCW artificial cavities in existing clusters	Wildlife			X				X	
	Create RCW recruitment sites	Wildlife							X	
	Erect and maintain signs around RCW clusters	Wildlife	X							
	Map endangered species sites		X		X		X		X	
	Participate in regional working groups (RCW translocation coop.; Carolina Sandhills RCW working group)	Wildlife	X		X					
	RCW Data Analysis	Wildlife					X		X	

Year	Activity	POC	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
			Planned	Complete	Planned	Complete	Planned	Complete	Planned	Complete
	Prepare Annual RCW Report to USFWS	Wildlife	X							
	Attend annual USFWS/Army Meeting	Wildlife			X					
	Update GIS Data	Forestry/ Wildlife	X		X		X		X	
	Operate MAPS Station	Wildlife					X		X	
	Conduct species at risk (SAR) surveys	Wildlife			X		X			
	Compile and submit MAPS data	Wildlife							X	
	Complete migratory bird point counts	Wildlife					X			
	Conduct TES planning level surveys	Wildlife			X		X			
	Conduct white-tailed deer survey	Wildlife			X					
	Conduct bobwhite quail survey	Wildlife					X			
	Conduct turkey survey	Wildlife					X			
	Conduct furbearer survey	Wildlife	X							
	Conduct nightjar survey	Wildlife					X			
	Maintain wood duck boxes	Wildlife	X		X					
	Maintain kestrel boxes	Wildlife	X		X					
	Maintain purple martin nesting structures	Wildlife			X					
	Implement the food plot management plan	Wildlife	X				X			
	Conduct recreational fisheries population assessments	Wildlife					X			
	Conduct aquatic weed control	Wildlife					X		X	
	Stock fish in ponds	Wildlife	X							
	Conduct monitoring for animal damage and nuisance wildlife	Wildlife	X		X		X		X	
	Implement animal damage/nuisance wildlife control	Wildlife	X		X		X		X	

Year	Activity	POC	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
			Planned	Complete	Planned	Complete	Planned	Complete	Planned	Complete
	Collect and analyze game harvest data	Wildlife/ MWR	X						X	
	Collect and analyze creel survey data	Wildlife			X		X		X	
	Implement silvicultural prescriptions- non-ESA HMU	Forestry	X							
	Implement prescribed fire prescriptions- non-ESA HMU	Forestry	X		X		X		X	
	Conduct post-burn evaluations- non-ESA HMU	Forestry	X		X		X		X	
	Conduct invasive species surveys	Wildlife			X		X			
	Implement invasive species controls	Wildlife/ Forestry					X		X	
	Conduct monitoring of forest insects and diseases	Forestry					X			
	Implement control of forest insects and diseases	Forestry					X			
	Conduct Environmental Awareness Training	Wildlife/ EMB	X		X		X		X	
	Obtain/renew required permits	Wildlife	X							
	Report white-tailed deer harvest data to state DNR	Wildlife			X					
	Earth Day	Wildlife/ EMB			X					
	Conduct TES surveys for projects*	Wildlife								
	Complete Section 7 Consultations*	Wildlife								
	Inspect construction/project sites for USFWS compliance*	Wildlife								
	Conduct wetland surveys*	Wildlife								
	Conduct wetland delineations*	Wildlife								
	Complete wetland permit applications*	Wildlife								

Year	Activity	POC	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
			Planned	Complete	Planned	Complete	Planned	Complete	Planned	Complete
	Implement soil erosion projects related to TES or Cultural Resources*	Wildlife								
	Coordinate with SCDNR for wildlife regulation changes*	Wildlife								
	Perform maintenance and repairs on Bivouac Sites 1-15	ITAM			X		X		X	
	Perform erosion repairs on foot maneuver corridors	ITAM			X		X		X	
	Perform erosion repairs and drainage stabilization near multiple LPAs	ITAM			X					
	Perform erosion repairs in training Areas 5A, 5B, 4C, 16A, 16B	ITAM			X		X		X	
	Develop Bivouac Site 5	ITAM	X		X		X		X	
	Perform erosion repairs around MOUT site	ITAM					X			
	Develop expansion of Bivouac Site 7	ITAM	X		X		X		X	
	Perform analysis to create 2016 training area utilization map	ITAM					X			
	Monitor vegetation encroachment of Landing Zones (LZ)	ITAM			X		X		X	
	Monitor erosion on maneuver access trails	ITAM			X		X		X	
	Monitor high-use areas for repair/erosion	ITAM			X		X		X	
	Monitor bivouac sites for repair/erosion/vegetation encroachment	ITAM			X		X		X	
* Action planned and conducted as needed										

Year	Activity	POC	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
			Planned	Complete	Planned	Complete	Planned	Complete	Planned	Complete
FY2018	Maintain signs around smooth coneflower site	Wildlife	X							
	Monitor smooth coneflower for training related damage	Wildlife	X		X		X		X	
	Prepare Flora Annual Report to USFWS	Wildlife	X							
	Assess anti-erosion measures on endangered plants	Wildlife			X					
	Clear woody vegetation from smooth coneflower site	Wildlife			X					
	Maintain fencing and excluders at smooth coneflower site	Wildlife			X					
	Prescribed burn the rough-leaved loosestrife site	Forestry/ Wildlife			X					
	Monitor rough-leaved loosestrife	Wildlife					X			
	Monitor smooth coneflower	Wildlife					X			
	Conduct RCW Monitoring	Wildlife	X		X		X		X	
	RCW Annual Cavity Tree Inspections	Wildlife	X							
	Identify and map areas in need of midstory control	Wildlife	X		X		X			
	Prepare contract SOW for midstory control	Wildlife	X							
	Implement midstory contract	Wildlife	X		X					
	Perform in-house chemical mechanical midstory treatments	Wildlife/ Forestry							X	
	Implement prescribed fire plan for RCW	Forestry/ Wildlife	X		X		X			
	Conduct post-burn evaluations for RCW habitat	Forestry/ Wildlife	X		X		X			
	Implement silvicultural prescriptions for endangered species habitat	Forestry/ Wildlife	X		X					

Year	Activity	POC	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
			Planned	Complete	Planned	Complete	Planned	Complete	Planned	Complete
	Inspect timber harvests for RCW compliance	Wildlife	X		X					
	Conduct forest inventory for endangered species management	Forestry/ Wildlife							X	
	Native Groundcover Restoration-Planting	Wildlife			X					
	Native Groundcover Restoration-Monitoring	Wildlife					X		X	
	Replace/install new RCW artificial cavities in existing clusters	Wildlife			X				X	
	Create RCW recruitment sites	Wildlife							X	
	Erect and maintain signs around RCW clusters	Wildlife	X							
	Map endangered species sites		X		X		X		X	
	Participate in regional working groups (RCW translocation coop.; Carolina Sandhills RCW working group)	Wildlife	X		X					
	RCW Data Analysis	Wildlife					X		X	
	Prepare Annual RCW Report to USFWS	Wildlife	X							
	Attend annual USFWS/Army Meeting	Wildlife			X					
	Update GIS Data	Forestry/ Wildlife	X		X		X		X	
	Operate MAPS Station	Wildlife					X		X	
	Conduct species at risk (SAR) surveys	Wildlife			X		X			
	Compile and submit MAPS data	Wildlife							X	
	Complete migratory bird point counts	Wildlife					X			
	Conduct TES planning level surveys	Wildlife			X		X			
	Conduct fox squirrel survey	Wildlife	X		X		X		X	

Year	Activity	POC	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
			Planned	Complete	Planned	Complete	Planned	Complete	Planned	Complete
	Conduct white-tailed deer survey	Wildlife			X					
	Conduct bobwhite quail survey	Wildlife					X			
	Conduct turkey survey	Wildlife					X			
	Conduct furbearer survey	Wildlife	X							
	Conduct nightjar survey	Wildlife					X			
	Maintain wood duck boxes	Wildlife	X		X					
	Maintain kestrel boxes	Wildlife	X		X					
	Maintain purple martin nesting structures	Wildlife			X					
	Implement the food plot management plan	Wildlife	X				X			
	Conduct recreational fisheries population assessments	Wildlife					X			
	Conduct aquatic weed control	Wildlife					X		X	
	Stock fish in ponds	Wildlife	X				X			
	Conduct monitoring for animal damage and nuisance wildlife	Wildlife	X		X		X		X	
	Implement animal damage/nuisance wildlife control	Wildlife	X		X		X		X	
	Collect and analyze game harvest data	Wildlife/ MWR	X						X	
	Collect and analyze creel survey data	Wildlife			X		X		X	
	Implement silvicultural prescriptions- non-ESA HMU	Forestry	X							
	Implement prescribed fire prescriptions- non-ESA HMU	Forestry	X		X		X		X	
	Conduct post-burn evaluations- non-ESA HMU	Forestry	X		X		X		X	
	Conduct invasive species surveys	Wildlife			X		X			
	Implement invasive species controls	Wildlife/ Forestry					X		X	

Year	Activity	POC	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
			Planned	Complete	Planned	Complete	Planned	Complete	Planned	Complete
	Conduct monitoring of forest insects and diseases	Forestry					X			
	Implement control of forest insects and diseases	Forestry					X			
	Conduct Environmental Awareness Training	Wildlife/ EMB	X		X		X		X	
	Obtain/renew required permits	Wildlife	X							
	Report white-tailed deer harvest data to state DNR	Wildlife			X					
	Earth Day	Wildlife/ EMB			X					
	Conduct TES surveys for projects*	Wildlife								
	Complete Section 7 Consultations*	Wildlife								
	Inspect construction/project sites for USFWS compliance*	Wildlife								
	Conduct wetland surveys*	Wildlife								
	Conduct wetland delineations*	Wildlife								
	Complete wetland permit applications*	Wildlife								
	Implement soil erosion projects related to TES or Cultural Resources*	Wildlife								
	Coordinate with SCDNR for wildlife regulation changes*	Wildlife								
	Perform maintenance and repairs on Bivouac Sites 1-15	ITAM			X		X		X	
	Perform erosion repairs on foot maneuver corridors	ITAM							X	
	Develop expansion of Bivouac Site 7	ITAM	X		X		X			
	Perform erosion repairs and drainage stabilization near multiple LPAs	ITAM			X					

Year	Activity	POC	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
			Planned	Complete	Planned	Complete	Planned	Complete	Planned	Complete
	Monitor vegetation encroachment of Landing Zones (LZ)	ITAM			X		X		X	
	Monitor erosion on maneuver access trails	ITAM			X		X		X	
	Monitor high-use areas for repair/erosion	ITAM			X		X		X	
	Monitor bivouac sites for repair/erosion	ITAM			X		X		X	
* Action planned and conducted as needed										